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CIRCULARS OF INFORMATION

OF THE

U.S.

BUREAU OF EDUCATION.

No. 1—1884.

MEETING OF THE INTERNATIONAL PRISON CONGRESS AT ROME, IN OCTOBER, 1884.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

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CONTENTS.

LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, March 5, 1884.

SIR: Thoughtful educators are accustomed to consider education in its wide sense, and to treat it as including all the influences and processes by which the human being is best shaped and adapted for the duties of life; as comprehending not only the normal, healthy, well disposed, favorably surrounded human being, but also the abnormal, unhealthy, vicious, and unfortunate. In the science and art of education, as in the science and art of health, we should study the pathology as well as the physiology of our theme. Therefore, the mission, methods, and results of punishment by the state for moral disorder when manifested in open wrong-doing are proper subjects for the consideration of all educators who would understand more than the mere routine of school work. The requests received by this Office for information on various bearings of the subject are numerous. A considerable number of its correspondents are teachers in reformatory and prison schools.

The approaching International Prison Congress at Rome, in October of the present year, will afford a rare and to many a unique opportunity for the thorough discussion and revision of these topics, and information respecting its character, purposes, and programme doubtless will be found useful by the correspondents of the office. For their use, and with the desire of calling the general attention of the teaching profession in this country to this important congress and its work, the following papers are presented for publication as a circular of information.

I am, sir, very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

Publication approved.

H. M. TELLER,
Secretary of the Interior.

THE INTERNATIONAL PRISON CONGRESS.

HISTORICAL SKETCH OF PREVIOUS CONGRESSES.

The International Penitentiary Commission has made the preliminary arrangements for the reassembling of the International Prison Congress at Rome, in October of the present year.

There was a series of similar gatherings for the study of the prison question many years ago. Three meetings were called, the first at Frankfort-on-the-Main in 1845, the second at Brussels in 1846, and the third at Brussels in 1857.

From that time until 1868 no effort was made to bring together from distant lands the persons interested in this important subject.

But in 1868, Count Sollohub, of Russia, in a paper prepared by him for publication in the annual report of the New York Prison Association, submitted to all who felt concerned for the future of prisons a proposition to convoke an international reunion of specialists and jurisconsults, who, under the patronage of their respective governments, should be charged with the duty of giving to penitentiary science its definitive principles.

The suggestion made by this distinguished Russian was adopted by Dr. E. C. Wines, then the secretary of the New York association, and after an extended correspondence with persons on both sides of the Atlantic, which revealed a very general desire for such a convocation, the first step toward it was taken when, in 1870, a call was issued for a National Prison Congress to meet at Cincinnati, in October.

At the Cincinnati Congress (which was presided over by Governor R. B. Hayes, of Ohio, afterward President of the United States), a committee of ten was appointed to organize a national prison association.

It was further resolved to employ a competent agent or commissioner, to make all the preliminary arrangements for an international congress, and the committee on the organization of a national association was instructed to endeavor to procure for the commissioner an honorary appointment from the General Government.

Dr. Wines was chosen, by a unanimous vote, to act as commissioner for this purpose.

Congress promptly passed an act authorizing the President to appoint a commissioner to the proposed international congress, which appointment was placed in the hands of Dr. Wines, and, thus doubly armed, he

visited Europe, and spent the summer and autumn of 1871 in negotiating with the European governments.

The success of this mission was beyond what could have been anticipated, and the first International Prison Congress of the present series convened in London in July, 1872.

The London Congress created a permanent International Commission, constituted as follows: Dr. Wines, chairman; Signor Beltrani-Scalia, Italy, secretary; and eight other members, representing England, France, Belgium, the Netherlands, Russia, Austria, and Germany. It was afterward enlarged and a partly official character given to it by the appointment of official delegates by the governments of France, Sweden, Norway, Denmark, Italy, Switzerland, Holland, and the Grand Duchy of Baden.

This commission prepared the second International Congress, which assembled in Stockholm in August, 1878. Dr. Wines, who was again appointed commissioner from the United States was made its honorary president, the actual president being the acting prime minister of Sweden.

At Stockholm a constitution was adopted for the International Commission, by which it is composed exclusively of official delegates named by the governments which adhere to the movement. It is charged with the duty, among others, of preparing for a new congress at intervals of not less than five years; and for the purpose of meeting its incidental expenses, including the cost of publication of an international bulletin, each government sending delegates is expected to pay an annual contribution of a sum not to exceed ten dollars for each million inhabitants, which would make the annual contribution of the United States not more than $500. The whole movement was placed under the patronage of the Swedish Government, which undertook to make the necessary diplomatic representations to the governments with which it is in correspondence.

To the overtures made by the Swedish minister to the Government of the United States, the reply was made by the Secretary of State that in the absence of an appropriation by Congress the State Department was unable to enter into any arrangement which involved the expenditure of money; and here the matter was allowed to drop. Minister Noyes attended one meeting of the International Commission at Paris, on behalf of the United States, but no American member of that commission has yet been named by the President.

Now, the International Commission has issued its call for the Congress at Rome, and signified its desire that not only the National Government, but the State governments as well, shall send delegates to attend its sessions. The history above given shows how prominent has been the part taken in the movement by our Government, which in fact organized and led it. It may be taken for granted that the Government will provide for a proper representation of the country at Rome. To this end,

both the National Conference of Charities and Corrections and the National Prison Association have duly memorialized Congress and the President. In his annual message, the President made allusion to this, among other international reunions of an official or semi-official sort for representation in which an appropriation is desirable, and there can be no doubt of the response which Congress will make to his suggestion.

THE PROGRAMME.

SECTION I.—PENAL LEGISLATION.

First question.—Is the temporary deprivation of civil or political rights compatible with a reformatory prison system?

Second question.—Might it not be well to dispense with imprisonment for misdemeanors, and to substitute for imprisonment some other restriction upon personal liberty; for instance, the obligation to work in some public establishment, but without detention; or a prohibition against passing, for a specified time, beyond certain specified limits; or even, in case of a first offence of trivial character, simple admonition?

Third question.—What should be the extent of the discretion as to length of sentence allowed to judges by the criminal code?

Fourth question.—What legislation is necessary in order more effectually to reach receivers of stolen goods, and others who instigate or profit by the crimes of others?

Fifth question.—How far should parents and guardians be held legally responsible for offences committed by their children or wards?

Sixth question.—What discretionary power should be conferred upon judges relative to the commitment of juvenile delinquents to educational or reformatory establishments, both where justice demands their acquittal as having acted without discernment and where it demands their conviction and the infliction of some penalty involving deprivation of liberty?

SECTION II.—PRISON DISCIPLINE.

First question.—In the light of the latest experiments in prison architecture, what changes in the construction of cellular prisons are practicable which would render them more simple and diminish their cost without prejudice to the conditions which are essential to a wise and efficient application of the cellular system?

Second question.—What is the best organization for those local prisons which are meant to be used as places of detention while awaiting trial or as places of incarceration for misdemeanors for short terms only?

Third question.—Ought not some form of imprisonment to be devised which would be better adapted than any of our existing systems to agricultural communities, where the population is unaccustomed to mechanical pursuits?

Fourth question.—What is the practical value of prison boards or commissions? How should they be constituted and what authority should be vested in them by law?

Fifth question.—On what principles of hygiene and of discipline should prison dietaries be based?

Sixth question.—Is the public account system of prison labor preferable to the contract system?

Seventh question.—To what extent is convict labor injurious to free labor? and how should labor in prisons be organized so as to reduce to a minimum the bad effects of competition between the two?

Eighth question.—What privileges may be granted to prisoners without detriment to themselves or the discipline of the prison? Especially, how far may they be allowed to dispose at will of their earnings?

Ninth question.—To what extent should education be carried in prisons? and what is the best mode of organizing and conducting a prison school?

Tenth question.—What use may be made of Sundays and holidays, in the interest of education, in addition to their consecration to worship and religious instruction?

SECTION III.—PREVENTIVE MEASURES.

First question.—Ought not refuges for discharged convicts to be established? How is this need to be supplied?

Second question.—What steps can be taken to bring about a general exchange of criminal registers between governments of different nations?

Third question.—Might not a clause be inserted in treaties of extradition which would provide for the exchange of convicts of alien birth where the offences of which they are convicted are punishable under the codes of both nations, the classes of criminals to be exchanged to be governed by the treaty stipulations?

Fourth question.—What are the most effective agencies for the prevention and repression of vagrancy?

Fifth question.—Ought visits to prisoners on the part of members of prisoners' aid societies or other benevolent organizations, having no official connection with the administration, to be allowed and encouraged?

MEMORIAL OF THE NATIONAL CONFERENCE OF CHARITIES AND CORRECTIONS.

The Conference of Charities and Corrections, convened at Louisville, Ky., September 24–28, 1883, and representing the organized and individual charities and penal and reformatory institutions in the several States and in the District of Columbia, calls the attention of the President and Congress of the United States and of the governor and legislature of each State to the International Congress to convene at Rome,

in Europe, October 15, 1884, and urges upon each the importance to this country, to our institutions, and to humanity of a suitable representation of these States in that International Prison Congress.

An American philanthropist, the late Dr. E. C. Wines, organized and put into action the International Prison Congress, and he took an active part in its meetings in London, in 1872, and again in Stockholm, in 1878, as commissioner under appointment, and this country and Europe are reaping benefits resulting from the able and enlightened discussions at those meetings. Many important questions of criminal jurisprudence, of prison discipline, and of preventive measures will be before the Prison Congress for discussion and solution, and the United States, having institutions the most free, humane, enlightened, and progressive of any in the world, cannot afford to withhold their aid or be absent from a congress dealing with such questions. Therefore this Conference of Charities and Corrections respectfully asks that Congress take due action to send to the coming meeting of the International Prison Congress three representatives, each from a different part of the country, to take part in its discussions and deliberations and to bring to the United States the advanced wisdom and best results of its labors.

M. D. FOLLETT.
W. G. BULLOCK.
JNO. W. HENRY.
A. H. YOUNG.
Z. R. BROCKWAY.

RESOLUTION OF THE CONVENTION OF PRISON WARDENS.

Resolved, by the wardens of prisons in the United States, assembled in convention in New York, That the attention of the Congress of the United States is called to the coming meeting of the International Penitentiary Congress, to be held at Rome, in October of this year, and that we hereby express our earnest wish that the Government will provide for suitable representation of this country at that meeting.

EXTRACT FROM THE MESSAGE OF PRESIDENT ARTHUR.

In view of the frequency of invitations from foreign governments to participate in social and scientific congresses for the discussion of important matters of general concern, I repeat the suggestion of my last message, that provision be made for the exercise of discretionary power by the Executive in appointing delegates to such convocations. Able specialists are ready to serve the national interests in such capacity without personal profit or other compensation than the defrayment of expenses actually incurred, and this a comparatively small annual appropriation would suffice to meet.

CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 2—1884.

ADDITIONS

TO

THE TEACHING, PRACTICE, AND LITERATURE OF SHORTHAND,

BY JULIUS ENSIGN ROCKWELL, STENOGRAPHER.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1885.

ADDENDA.

The first edition of this work having been for some months exhausted, a second issue is called for. As it was originally printed from stereotype plates it has been impossible to make any important changes in the body of the volume. The editor, though no longer connected with the Bureau of Education, has been glad to offer his services in bringing the bibliography of shorthand up to date and in completing, as far as possible, this important chapter in the history of the art. He regrets that the circumstances mentioned prevent the thorough revision of the volume and its extension in several directions.

To those who have facilitated this work hearty thanks are returned; especially to Mr. William Relton, of Liverpool, and to Mr. E. B. Nicholson, of the Bodleian Library, is the appendix indebted for valuable material.

Those interested in the history of swift writing are invited to communicate with the editor and to advise him of any inaccuracies in these lists or to furnish any additional information that may be in their possession.

J. E. R.

U. S. PATENT OFFICE,
Washington, D. C., January 26, 1885.

ADDITIONAL CHRONOLOGICAL LIST OF ENGLISH AND AMERICAN AUTHORS OF SHORTHAND TEXT BOOKS.

The following authors of shorthand systems and text books in the English language, with anonymous works of the same character, are to be added to the chronological list beginning on page 10.[1]

S. Shelton. 1672.
John West. 1784.
Charles Kerin. 1836.
J. Clarke. (About 1840.)
James Glover. 1840.
G. and W. Short. (About 1840.)
New system of phonography. (About 1840.)
Penny system. (1842.)
Stephen Pearl Andrews. 1844.

[1] The following changes should be made in this list: James Mitchell, 1807, should be 1815; Duncan Macdougall, 1834, should be 1825; British shorthand, 1840, should be 1839; Henry M. Parkhurst, 1870, should be 1849; W. E. Scovil, 1871, should be 1855; James Singleton, about 1875, should be 1876; and James Simson, 1883, should be 1881.

George L. Artis. 1845.
Henry Jones. 1845.
Gassion. 1857.
William Pettigrew. (1864.)
Phonographic Alliance. 1865.
D. Birrell. (About 1870.)
Gregory. (About 1870.)
Marr. (About 1870.)
Some proposed changes. (About 1870.)
T. H. Gleason. (About 1875.)
Robert S. Goodman. 1876.
Mr. and Mrs. D. L. Scott-Browne. 1882.
W. B. Livingstone. 1882.
J. M. Sloan. 1882.
H. R. Stoddart. 1882.
John Westby-Gibson. 1883.
M. Armitage. 1884.
George R. Bishop. 1884.
Frederick Childerstone. 1884.
Frederick H. Cogswell. 1884.
William A. Crane. 1884.
W. B. Gurney and sons. 1884.
W. C. Horner. 1884.
A. McKnight and William E. Morgan. 1884.
Adam Miller. 1884.
Eldon Moran. 1884.
W. S. North. 1884.
John Pickles. 1884.
Reporter's hand-book. 1884.
Frederick Todd. 1884.
T. A. Turner. 1884.
J. S. White. 1884.

ADDITIONAL BIBLIOGRAPHY OF AMERCIAN AND ENGLISH AUTHORS.

Substitute, p. 61, col. 2:

Aitchison, Jasper and John. A new system of short-hand, in which legibility, & brevity are secured upon the most natural principles, with respect to both the signification and formation of the characters, especially by the singular property of their sloping in general, according to the habitual motion of the hand in common writing, by Jasper and John Aitchison. London; printed for the authors, 31, Poland street, Oxford street. 1832. 20 pp.

Insert, p. 62, col. 1:

American exchange club. Catalogue of the American exchange club. An organization for the dissemination of shorthand literature. November, 1884. New York: E. N. Miner, Broadway, head of Astor place. 16 pp.

P. 62, col. 2:

Anderson, Thomas. Catechism of short-hand, &c.

Seventh line, between "of" and "writing," insert "short;" 12th line, for "70 pp." read "vii & 70 pp."

—— History of shorthand, &c.

Add: Price 12s. 6d.

Insert, p. 63, col. 1:

Andrews, Stephen Pearl. The phonographic class-book. "Practice and persevere." S. P. Andrews. Phonographic institution, No. 21, School street, Boston. 1844. Second edition. 24 lith. pp.

Insert, p. 64, col. 1:

Angell, John. Stenography, &c.

—— The fourth edition. London: printed for and sold by M. Angell in Lincoln's Inn passage, B. Martin in Fleet street, and John Angell, Fownes street, Dublin. Entered in the Stationers hall book. Price bound 10 shillings Eng^{h}. [Colophon: Dublin, 1787.] Eng. title, 61 pp. & 21 plates.

Insert, p. 64, col. 2:

Annet, Peter. Annet's short-hand perfected; containing plain and easy examples for learning it. Printed for J. Dixwell, No. 148, St. Martin's lane, Charing Cross. London. (1778.) 1s. 6d.

Insert, p. 64, col. 2:

Armitage, M. Syllabic writing: or short-hand made easy. A new system of short-hand, in which the vowels are implied, more easy to learn, and more certain to read than most other systems of short-hand yet published. By M. Armitage, (postmaster of Batley,) certified teacher of shorthand for upwards of 35 years. Entered at Stationers' hall. Batley: printed and published by M. Armitage and son. London: John Heywood, 11, Paternoster row, E. C. G. Philips and son, 32, Fleet street, E. C. Liverpool: G. Philips and son, Caxton buildings. Manchester: John Heywood, Deansgate and Ridgefield. 1884. Price two shillings and sixpence. 46 pp.

Armitage, M.— Continued.

— Syllabic writing; or shorthand made easy. By M. Armitage. A new system of shorthand, in which the vowels are implied, adapted for the use of schools and students. A class book, with progressive exercises. Suitable for teachers who are giving shorthand lessons. The alphabet is composed of the simplest geometrical signs, all light characters, and of easy combination. The principles of the system are so concise and practicable, that a child may learn the art in a very short space of time. Entered at Stationers' hall. Price sixpence. To be had of the publishers and of all booksellers. Batley: M. Armitage and son, printers and publishers, post office. 1884. 15 pp.

Insert, p. 65, *col.* 1:

Artis, George L. A short-hand dictionary and stenographical copy book, dedicated (by permission,) with every feeling of respect, to Sir James Campbell, by his humble servant, George L. Artis. (Not published.) 1845. 64 pp. incl. lith. plates. Size of pp. 8 x 5 inches.

[Gurney's system modified.]

Insert, p. 65, *col.* 2:

Bailey, John Eglington. [From the papers of the Manchester literary club. Volume II. 1876.] On the cipher of Pepys's diary: abstract of a paper read at the Manchester literary club, 14th December, 1875. By John E. Bailey, F. S. A. Manchester: 1876. 8 pp. letterpress & 4 lith. pp.

Insert, p. 65, *col.* 2:

Bailey, Phinehas. A system of stenography; or, short hand writing. Selected from the most approved authors, with new improvements. By Phinehas Bailey. Haverhill: printed by Burrill & Hersey. 1821. 18 pp.: characters made with a pen.

Insert, p. 66, *col.* 2:

Ball, Rev. W. J. Principles for outlines. 1875. MS.

[Isaac Pitman's phonography modified.]

Substitute, p. 67, *col.* 1:

Beale, Joseph. The shorthand master. London: Houlston & sons, Paternoster buildings, E. C. Nottingham: Stevenson, Bailey & Smith, Lister gate. 1876. 12 pp. & 5 plates.

Insert, p. 68, *col.* 1:

Bell, Alexander Melville. Shorthand.

[Pp. 82-85 of The principles of speech and vocal physiology, and dictionary of sounds. London: Hamilton, Adams & Co. Edinburgh: W. P. Kennedy. Dublin: McGlashan & Gill. 1863. 254 pp. 5s.]

Insert, p. 68, *col.* 1:

Bennett, Eugene. Condensed longhand. A guide to a practical acquaintance with the art, by means of which the principal advantages of shorthand are secured without resort to stenographic characters, and with perfect legibility. By Eugene Bennett. New York. 1883. $1.00.

P. 68, *col.* 1:

Bennett, John. Short-hand explained, &c., 1825.

Add 4s. 6d. boards; same, 1828, add 12s.; same, 1832, add 4 & 39 pp. & 9 plates.

Substitute, p. 68, *col.* 2:

Bennett, John. Shorthand exercises, or the stenographic tutor, in which 700 examples of the mode of abridgment and combination are displayed; in reference to a new system entitled "Shorthand explained," by the same author, to which it is a supplement. The whole applied to common-place phraseology, which, from its recurrence, constitutes so large a proportion of the actual diction of our language. By John Bennett. London: printed for Longman, Hurst, Rees, Orme, Brown and Green, Paternoster row; Simpkin and Marshall, Stationers' court; Souter, St. Paul's church yard; H. Mozley, Derby; Chalmers and Collins, Glasgow; and S. H. Cowell, Ipswich. 1825. 59 pp. Price 2s. in boards.

Insert, p. 68, *col.* 2:

Birrell, D. Exercises to be translated into Pitman's shorthand, compiled by D. Birrell, 13 Everton road, Liverpool, certificated by the inventor, Mr. Isaac Pitman, Bath, as a qualified teacher of his system of phonetic shorthand in 1863. Private instruction given at any hour. Public classes every evening, at the class room, 13 Everton road, from five to ten p. m. (About 1870.) 48 pp.

Insert, p. 68, col. 2:

Bishop, George R. Outlines of a modified phonography; by Geo. R. Bishop, stenographer of the N. Y. Stock Exchange; president (in 1877) of the Law stenographers' association of the city of New York, and lately president of the N. Y. State stenographers' association. New York: published by the author. 1884. 23 pp. letterpress and 24 lith. pp.

—— A note, to "Outlines of a modified phonography, by George R. Bishop." [New York. 1884.] 6 lith. pp.

—— A brief comparison with Mr. Longley. [New York, 1884.] Lith. fcap sheet.

Insert, p. 70, col. 1:

Boswell. Short historical sketch. London. 1880.

P. 70, col. 1:

Botley, Samuel. Maximum in minimo, &c. First title.

Add: eng. & printed title pp. & 28 eng. pp.

Insert, p. 70, col. 1:

Botley, Samuel. Maximum in minimo or Mr Jeremiah Rich's Pens dexterity compleated with the whole terms of the law—by Samuel Botley. Teacher of the said art over against Vintners hall in Tham-streete, where also the Psalmes and the new Testament curiously printed in the same character are to be sould. London. Printed and sould by Samuel Botley and no where else. (1674?) Portraits of Rich and Botley, eng. title p. & 30 eng. pp.

Substitute, p. 70, col. 1:

Brachygraphy, or a new shorthand alphabet, by the help of which alone any person may, in a short time, learn that useful & expeditious method of writing. * * * London: publish'd Apr. 14th, 1788, by John Wallis, Ludgate street, John Binns, Leeds, & Lewis Bull, Bath. Price 6 pence. Eng. card 4½ x 6½ inches.

P. 70, col. 1:

Bright, Timothe. See Pocknell, Edward.

Insert, p. 70, col. 2:

British (The) short-hand; combining simplicity, brevity & perspicuity. By which any person may teach himself the useful art of short-hand writing, in an incredibly short space of time, without the aid of a master! And will enable him, with a little practice, to follow a speaker through all the labyrinths of a learned discourse. London: G. Berger, Holywell-street, Strand; and George Odell, 18, Princes-street, Cavendish street, 1839. 24 pp. & 5 plates. 2s.

Substitute, p. 70, col. 2:

British (The) short-hand. Gurney's popular system of short-hand, simplified and improved: by which any person may teach himself the useful art of short-hand writing, in a few hours, without the aid of a master! And which will enable him, with a little practice, to follow a speaker. London: Simpkin, Marshall and Co., Stationers' hall court. 1843. 24 pp. & 5 plates.

[For second edition, see Gurney's popular system, &c., p. 90, col. 1.]

Insert, p. 70, col. 2:

Brown, D. S. Abbreviations. 14 pp. 1d. [In Brown's original repository, No. 3. London: Edward Stanford, 6, Charing cross. 1857.]

—— An incipient system of abbreviation intended chiefly for letter writing. London: Edward Stanford, 6, Charing cross. 1864. 8 pp. 2d.

—— Abbreviation on the incipient principle. Intended chiefly for correspondence. London: Elliot Stock, 62 Paternoster row. 1875. 15 pp. 2d.

Insert, p. 71, col. 2:

Browne, D. L. Scott-. Scott-Browne's Munson's style first phonographic reader. Affording reading and writing practise on the reporting principles of the art as employed in a simple style of language. Keyed by the popular Appleton's third reader. Engraved from the notes of several writers of the Munson system as it is used in professional reporting. A. Series. New York: D. L. Scott-Browne. 1882. 25 pp.

—— Scott-Browne's American book of business letters. A collection of letters actually transmitted in business and professional correspondence; together with lists of commercial technicalities, forms of agreements, proposals, specifications, etc. Adapted for use in schools of phonography, commercial colleges,

Browne, D. L. Scott-.—Continued. and for private practice in gaining speed in short-hand writing and learning business forms and expressions. By D. L. Scott-Browne, editor of Browne's phonographic monthly, conductor of Phonographic bureau, College of phonography, etc. Part III. New York: D. L. Scott-Browne. 1884. [Copyright by D. L. Scott-Browne.] 2 & 91 pp. numbered 185-276. 75 cents.

—— Scott-Browne's American standard book of shorthand abbrevations. A tabulated list of all the abbreviations of the system, numbering only 500; with a reference vocabulary of 3,000 words in common use; words of peculiar construction, and words that have been written in various ways; establishing uniformity for the first time in any system. Phrase-signs, technical longhand abbreviations with definitions, and 400 names of persons, places, etc. Pocket edition prepared for piece-meal study. By D. L. Scott-Browne, editor of Browne's phonographic monthly, (organ of the profession): author of the American standard series of shorthand text-books. New York: D. L. Scott-Browne. 1884. iv & 58 pp. 50 cents.

Insert, p. 71, *col.* 2:

Browne, D. L. Scott-. Scott-Browne's reporters' book of legal forms. Shows how the law reporter in taking testimony, indicates questions and answers, objections, rulings of the court, remarks of the counsel, exhibits, etc. Explains reference reporting and defines legal terms. With copious notes and key. Very useful as a legal dictation book. By D. L. Scott-Browne, etc., etc. New York: D. L. Scott-Browne. 1884. 32 pp.

Substitute, p. 71, *col.* 2:

Browne, D. L. Scott-. Scott-Browne's text-book of phonography. Unfolds the laws governing mental, physical, and mathematical action in rapid writing; gives full directions for the application of the principles to reporting, and defines the duties of the stenographer; enabling him to attain the highest proficiency in the art. For schools, colleges, and private institutions. By Mr. D. L. Scott-Browne, author of the American standard series of phonographic

Browne, D. L. Scott-.—Continued. text-books, and conductor of Scott-Browne's college of phonography in New-York city. Part II. First edition. New York: D. L. Scott-Browne. 1884. vi & 183 pp. $2.

Insert, p. 73, *col.* 2:

Cameron, George. Cameron's short-hand writer's pocket guide, &c.

—— Fifth thousand. Glasgow: George Cameron, 67 Virginia street. Edinburgh: John Menzies. London: George Vickers. 1858. 16 pp.

Substitute, p. 74, *col.* 1:

Cartwright, William. Semography, or short & swift writing, being the most easiest, exactest, and speediest, method of all other that have beene yet extant: the full understanding is so easily attain'd that the learner hereof need no other help but the book it selfe onely which will bring him to such exactnesse that in a short time he shall be able to take word for word after the speaker with much ease. Invented and composed for the benefit of others by the author hereof William Cartwright and is now set forth and published by his nephew, Ieremiah Rich, immediate next to the author deceased. There is divers that the professor hereof hath taught, that will affirm this hand to outgoe all others for briefnesse which have had the sight likewise of other hands. All which desire to learn this hand may have the booke to teach them. London: printed in the yeere 1642. viii & 20 pp.: characters made with a pen.

Insert, p. 74, *col.* 2:

Childerstone, Frederick. A study on Pitman's phonetic shorthand, being a critical enquiry into the theory of his vowel sounds, showing the perfections, imperfections, and inconsistencies therein; together with a method of expressing two vowel sounds not provided for in his system: also a method of quickly impressing certain of the grammalogues on the memory: by Frederick Childerstone, (principal of the South London and Surrey county school of shorthand.) Price 6d. London: printed for the author by W. C. Edmonds, 420, Brixton road, S. W. 1884. Entered at Stationers' hall. 16 pp.

Insert, p. 74, col. 2:

Clarke, J. British brachygraphy, or complete system of shorthand writing; the whole capable of being learned in a few hours, and applied to all the purposes of professional or mercantile business. By the Rev. J. Clarke, private teacher of the classics, mathematics, foreign languages, &c., &c. Manchester: printed by T. Sowler, Courier and Herald office. (About 1840.) 8 pp. letterpress & 8 eng. & 2 lith. plates.

Insert, p. 74, col. 2:

Clayton, Thomas L. Steganography, or, secret writing made easy, on an entire new plan, whereby professional gentlemen, students & other literary characters, may acquire that useful & necessary system in the course of a few hours, without the help of a master. By Thos. L. Clayton, (late of the Inner Temple) gent. Engraved by Jones, 51, Parliament st. West^r. Published as the act directs, Nov^r. 12: 1812. Price one shilling. Eng. sheet 4 x 6 inches.

Insert, p. 75, col. 1:

Clive, I. H. The linear system of shorthand, &c.

—— —— Fifth edition. Newcastle-under-Lyme: printed for the author by John Bayley. 1830. Price 6s. 6d. in boards. 107 pp. & 12 plates.

Insert, p. 75, col. 2:

Cogswell, Frederick H. Cogswell's compendium of phonography. Being a complete and concise exposition of the principles of verbatim reporting as practised by the best reporters. For self-instruction and for use in schools. By F. H. Cogswell, principal Cogswell's school of phonography; New Haven, Conn., editor of The phonographer, official reporter of the superior court in New Haven county. F. H. Cogswell, publisher, New Haven, Conn. U. S. A. 50 pp.

—— Phonographic reader.
[In press.]

—— Book of forms.
[In press.]

Insert, p. 76, col. 1:

Crane, William A. Spencergraphic shorthand or Crane's script. A new shorthand; giving the long-wished-for representation of the vowels, and securing absolute legibility, lineality and simplicity. The last barrier to the general adoption of the art removed. In two branches: I.—Alphabetic shorthand: for those who wish to retain the common spelling. II.—Spencerian phonetic shorthand: for those who prefer phonetic spelling. Each branch divided into three parts: Part I.—The full, letter for letter, style: for school, social and literary use. Part II.—The semi-abbreviated style: for legible amanuensis and business use. Part III.—The contracted style: for reporting the rapid utterances of the pulpit, bar, and rostrum. By Wm. A. Crane. Parts I and II of alphabetic shorthand complete in this volume. A complete class-book and self-instructor. Published by the New Shorthand Co., New York. Copyright, W. A. Crane, 1884.
[In press.]

Insert, p. 76, col. 2:

Cross, J. George. Cross's eclectic shorthand. A new system, adapted both to general use and to verbatim reporting. Complete in one volume. By J. Geo. Cross, A. M. Second edition. Chicago: S. C. Griggs and company. 1879. 304 pp.

Substitute, p. 77, col. 1:

Dangerfield, John. A stenographic lecture, as delivered at the Royal institution, on the 1st of March, 1825, and at the Mechanics' institution, on the 22d of June, 1825; with a supplement, containing a key to the lecture, which will be found not only useful to the learner, but to the man of business. By J. Dangerfield. Second edition. London: printed by W. Knight, Fleet-street, corner of Fetter-lane. 1834. 44 pp.: partly lith.

Substitute, p. 78, col. 2:

Doddridge, Philip. A system of shorthand: invented by Mr. Jeremiah Rich, and improved by Dr. Doddridge. Oxford: printed by Slatter and Munday. 1805. 28 pp.: characters made with a pen.

—— Rich's short-hand improved by Dr. Doddridge. Edited by the Rev^d. S.

Doddridge, Philip—Continued.
Wood, B. A. London: published by R. Hunter, St. Paul's churchyard. 1830. Price 2s. 6d. Lithographed by J. Netherclift, 8, Newman st. 22 lith. pp.

Insert, p. 79, col. 1:

Driesslein, Charles L. Notes from my reporting books, (Pitman system.) By Chas. L. Driesslein, reporter in the courts of Chicago, Ills. Published and for sale by Chas. L. Driesslein, Room 37 Ashland block, 59 Clark st., Chicago, Ills. (1884.) 62 lith. pp.

Insert, p. 79, col. 1:

Dundas, Charles. Stenography or shorthand writing made easy, containing directions, examples, &c., whereby the most common capacity may acquire a perfect knowledge of the art in a few hours. By Charles Dundas, author of "Chirology or method of teaching the deaf and dumb." "Nor study only, practice what you know, Your life—your knowledge to mankind you owe." Boston. September 1817. Wrote for the use of his pupils. 8 pp. & 3 plates. MS.
[In J. E. Rockwell's library.]

Insert, p. 79, col. 1:

Eames, Roscoe L. A comparison of light-line shorthand with phonography, and some reference to other systems. By Roscoe L. Eames. New York: A. S. Barnes & Co. 1884. 16 pp.

Insert, p. 79, col. 2:

Easy (An) introduction to shorthand, &c.
—— —— A new and improved edition. London: printed for B. Blake, Bell yard, Temple bar. 1825. 30 pp. & 3 plates.
—— —— Fourth and improved edition. London: printed for Henry Washburne, Salisbury square. 1835. 28 pp. & 3 plates.

Insert, p. 80, col. 2:

Everett, J. D. Shorthand for general use, &c.
—— —— Third edition, revised. London: Marcus Ward & Co., 67 & 68, Chandos street; and at Belfast and New York. 1883. [All rights reserved.] 26 & xli pp. 2s. 6d.
—— School shorthand, &c.

Everett, J. D.—Continued.
—— —— London: Bemrose & Sons, 23, Old Bailey; and Derby. V. L. Humphreys, Everett shorthand school, 55, Chancery lane. R. W. J. Trueman, Shorthand institute, 1, Lombard street, Belfast. 1883. Price 1s. 6d. 110 lith. pp.

Substitute, p. 80, col. 2:

Everett, J. D. A card of Everett's shorthand containing the whole system at one view. Bemrose & Sons, 23, Old Bailey, London, E. C.; and Derby. John Saunders, 16, Paradise street, Bath. R. W. J. Trueman, Shorthand institute, 1, Lombard street, Belfast, (to whom all inquiries as to tuition should be addressed.) 1883. Price one penny. Entered at Stationers' hall. 8 pp.

Substitute, p. 81, col. 1:

Ewington, Henry. The arcana of shorthand or expeditious writing made easy, by H. Ewington, M. A. The third edition. To which is now added regular lessons for want of which few have gained a perfect knowledge therein. Published by the author August 1805. Sold wholesale by Mr. Dedman, 12 Store st., Bedford sq., London, and by all booksellers in the United Kingdom. Portrait, 8 pp. & 8 plates.

Insert, p. 81, col. 1:

Ewington, Henry. Ewington's arcana of shorthand, arranged in regular lessons. Philadelphia: published by the author, corner of Twelfth and Chesnut streets. W. Brown, printer, Prune street. 1818. 12 pp. & 3 folding plates.
—— The arcana of shorthand, &c. 1830.
Add: 24 pp. & 8 plates. 2s. 6d. sewed.

Insert, p. 81, col. 1:

F., B. (Lessons in shorthand. Rich's system modified.) MS. (16 —.) 26 pp.
[In the Watkinson library, Hartford, Conn.]

Substitute, p. 82, col. 2:

Floyd, Rev. Aaron, for Floyd, A.

Insert, p. 83, col. 2:

Fraser, Alexander. Stenography, or the art of shorthand writing improved. Edinburgh. 1793. MS.
—— —— Another edition. 1797. MS.
[Both editions in Chetham library, Manchester. Gurney's alphabet.]

Insert, p. 83, *col.* 2:

Fretwell, William. A system of stenography which combines all the advantages of former systems without their defects. London. (About 1840.) MS.
[In Cornelius Walford's library. System based on that of Samuel Taylor.]

Insert, p. 84, *col.* 1:

Gassion. Alliance shorthand. Brighton — Gassion, 23, Upper North street.— 1857. Price 1d. Post-paid 2d. Printed on both sides of a card 4½ x 3¼ inches.
[The Alliance shorthand primer is advertised on this card as in press.]

Insert, p. 84, *col.* 2:

Gibson, John Westby-. Specimen written in the full or corresponding style of Dr. Westby-Gibson's English script shorthand or literal phonetics; a system at the same time alphabetical and phonetic. 1883. Lith. sheet.

Insert, p. 85, *col.* 1:

Gildersleeve, L. I. Combined shorthand. La Porte, Indiana. 1884. MS.
[Shortly to be printed.]

Insert, p. 85, *col.* 1:

Ginn, Alfred. How to write Pitman's shorthand correctly, by Alfred Ginn. Second edition. London: South eastern school of shorthand, 102 Newington causeway, S. E. 1884. 18 pp. 6d.

Insert, p. 85, *col.* 1:

Gleason, T. H. A synopsis of stenography, or system of short-hand writing. Arranged by Prof. T. H. Gleason. (Knightstown, Ind. About 1875.) Sheet 8 x 12 inches: characters made with a pen.

Insert, p. 85, *col.* 1:

Glover, James. [Geometric shorthand.] The expeditious and legible reporter; or an easy and practical system of shorthand. By James Glover, accountant, &c., Pudsey. Leeds: T. Harrison, 153 Briggate. London: Houlston & Stoneman. 1840. 27 pp. & 8 plates.

Insert, p. 85, *col.* 1:

Goodman, Robert S. Short hand for the million. Price 50 cents, complete. A new method of writing, by which any intelligent person can learn to write 100 words a minute after a few weeks' practice. The best, most rapid and easiest system extant. Published and for

Goodman, Robert S.—Continued.
sale by Robert S. Goodman, 30 North Seventh street, (third floor,) Philadelphia. (1876.) Copyrighted. Printed title p. & 24 lith. pp.

Insert, p. 85, *col.* 2:

Gould, Marcus T. C. The art of short-hand writing, &c.

—— —— Fourth edition. New York: published by Collins & Co. J. & J. Harper, printers. 1824. 36 pp. & 14 plates.

—— Declaration of American independence. [In shorthand.] Eng. sheet 8½ x 6 inches.

Insert, p. 86, *col.* 2:

Graham, Andrew J. A biographical sketch of Dr. James W. Stone. By a friend. With an appendix explanatory of peculiarities of standard phonography. By Andrew J. Graham. Translated from previous shorthand edition. With addenda; and with a great body of notes on the appendix, relating to the value and history of certain standard-phonographic peculiarities. New York: Andrew J. Graham, phonetic depot, 744 Broadway. 1884. 2 & 48 pp.

Insert, p. 87, *col.* 1:

Graham, Andrew J. First standard phonographic reader. New and revised edition: stereographed in the corresponding style; with an interpaged key. By Andrew J. Graham. New York: Andrew J. Graham, 744 Broadway. 1885. 72 eng. & 72 printed pp.; with 8 pages of notes. $1.75.

Substitute, p. 87, *col.* 2:

Graham, Andrew J. The standard-phonographic dictionary. By Andrew J. Graham, conductor of the Phonetic academy, New-York, and author of "The hand-book of standard phonography;" "The synopsis of standard phonography;" The first and the second standard-phonographic reader; "Brief longhand;" "A system for the rapid expression of numbers," etc. New York: published by Andrew J. Graham, 274 Canal street (near Broadway). 1863. 10 & 1043 pp.

Insert, p. 87, *col.* 2:

Graham, Andrew J. Standard-phonographic reading exercises, &c.

Graham, Andrew J.—Continued.
—— —— New and improved edition. New York. 1879.
—— Miniature series. Standard-phonographic reading exercises. Andrew J. Graham, author and publisher. 744 Broadway, New York. (1882.) 16 eng. pp. 3 x 5 inches.
—— Correspondent's list of word-signs, &c.
—— —— New and improved edition. New York. 1879.
—— —— Correspondent's list of word-signs and contractions of standard phonography. By Andrew J. Graham. (New York. 1882.) 21 pp.

Insert, p. 88, *col.* 1:

Graham, Andrew J. Miniature series. The little teacher of standard phonography. Andrew J. Graham, author and publisher, New York. (1882.) 4, 16, 16, 16, & 21 pp.
—— Miniature series. Standard-phonographic writing exercises. Being a key to the reading exercises of The little teacher. Andrew J. Graham, author and publisher, New-York. (1882.) 16 pp.

P. 88, *col.* 2:

Graham, Andrew J. The Lady of the lake.
Add: Frontispiece & 315 pp., 151 engraved. $2.

Insert, p. 88, *col.* 2:

Gratton, Charles J. The gallery. A sketch of the history of parliamentary reporting and reporters. By Charles J. Gratton. The gallery in which the reporters sit has now become a fourth estate of the realm.—Macaulay. London: Pitman, Paternoster row. 1860. viii & 142 pp.

Insert, p. 88, *col.* 2:

Gregory. Gregory's system of acquiring phonography. Matthews & Co., printers, Red Cross street. (London? About 1870.) 12 pp.

Substitute, p. 89, *col.* 1:

Gurney, Thomas. Brachygraphy: or short-writing made easy to the meanest capacity. The persons, moods, & tenses, being comprized in such a manner, that little more than the knowledge of the alphabet is required, to the writing hundreds of sentences, in less time than

Gurney, Thomas—Continued.
spoken. The whole is founded on so just a plan, that it is wrote with greater expedition than any yet invented, and likewise may be read with the greatest ease. Improv'd after upwards of thirty years practice and experience. By Tho: Gurney. The second edition. Good or bad sense are wrote with equal speed, No need of grammar rules to write or read; Let wise, or foolish, with their words abound, The faithful pen shall copy ev'ry sound: Ages unborn, shall rise, shall read, and say, Thus! thus! our fathers did their minds convey. Publish'd according to act of parliam^t. Price bound 8^s. (1752.) Portrait, eng. title, 34 eng. & 4 printed pp.
—— —— The eighth edition. Publish'd according to act of parliam^t. Price bound 8^s. (1772.) Portrait, eng. title, 4 & 46 pp. incl. 30 pp. eng.
—— See R. E. Miller and W. S. North.

Substitute, p. 89, *col.* 2:

Gurney, Thomas and Joseph. Brachygraphy, &c.
—— —— The eleventh edition. Printed for J. and M. Gurney: sold by M. Gurney, bookseller, No. 128, Holborn-Hill, London. Published as the act directs, Mar^h. 5, 1789. Price half a guinea. Portrait, eng. title p., vii, xv & 54 pp. & 12 plates.

Insert, p. 89, *col.* 2:

Gurney, W. B., & Sons. A text-book of the Gurney system of shorthand. Eighteenth edition. Edited by W. B. Gurney & Sons, shorthand writers to the houses of parliament. London: Butterworths, 7, Fleet street, E. C. Law publishers to the Queen's most excellent majesty. Dublin: Hodges, Figgis, & Co., Grafton street. Calcutta: Thacker, Spink, & Co. Melbourne: G. Robertson & Co. Limited. Manchester: Meredith, Ray, & Littler. Edinburgh: T. & T. Clark; Bell & Bradfute. 1884. 4 & 56 pp. incl. lith. plates. 3s.

Insert, p. 91, *col.* 1:

Harding, William. Universal stenography; or, a new, easy and practical system of shorthand, whereby a person may acquire the method of correctly reporting public debates, lectures, and

Harding, William — Continued.
sermons For the use of schools, and private tuition. By William Harding, (teacher of the art.) Illustrated with five elegant engravings. * * * Second edition, corrected and enlarged; with a new philosophical alphabet of fifteen letters, invented by the late eminent W. Blair, esq., M. A. (now first published from his manuscripts.) London. Published by Jos. Butterworth and son; Simpkin and Marshall, and Knight and Lacey. Sold by all booksellers. 1824. Frontispiece, 36 pp. & 4 plates.

Substitute, p. 91, *col.* 2:

Hargreaves, James. The expeditious writer. An improved system of short hand, combining simplicity, perspicuity, & brevity; adapted to the use of schools, private tuition and gentlemen engaged in mercantile, legal, literary, or parliamentary pursuits. Which may be learned in a few days without the aid of a master. By James Hargreaves, late master of the Commerical academy, London road, Manchester. Manchester, Simms & Dinham, Exchange street, & sold by all booksellers. 1841. 12 lith. pp. 2s.

Insert, p. 91, *col.* 2:

Harland, John. A new system of stenography, or short hand writing, adapted to practical use in reporting sermons, lectures, speeches; to the confidential correspondence of friends; and to a private diary of the thoughts, &c., &c., &c., by J. Harland. 1832. 21 pp. & 5 plates. MS.

—— (A history of shorthand. Manchester. About 1865.) 16 pp.

[Only one signature of this work, covering the introduction, and the Greek and Roman shorthand, without title, appears to have been printed. Sixteen manuscripts in shorthand and manuscript systems written by Mr. Harland are in the Manchester Reference library. A notice of his life and labors appeared in the Manchester Guardian (of which he was for many years chief of the reporting staff) April 25, 1868.]

Substitute, p. 93, *col.* 1:

Heath, Thomas. Stenography, or the art of short-writing: more easy and plain than formerly hath been extant, with examples and observations, which will help the learner so as he needeth no help but the book. Published by the author Tho. Heath stationer. Honos alit artes. London, printed and sold by the author at the Globe within Ludgate 1664. 16 pp. & 15 plates 6¼ x 4 inches.

HINE, Thomas. See Pitman, Isaac.

Substitute, p. 95, *col.* 1:

Hodson, Thomas. The art of stenography or shorthand. 29 pp. & folding plate.

[Section iv, vol. 1, of The accomplished tutor; or complete system of liberal education. London: Vernor & Hood. 1800.]

Insert, p. 95, *col.* 2:

Horner, W. C. W. C. Horner's system of phonetic shorthand. Pittsburgh, Pa.: press of Horner & Giles, 1884. 4 quarto pp.

HOWARD, Jerome B. See Pitman, Benn.

Insert, p. 96, *col.* 1:

Hunter, Andrew. An easy system of short-hand writing, selected by Mr. Hunter, teacher of stenography, Edinburgh. Designed for the use of schools and private learners. Go, thou obedient quill; in speed outstrip by far The well-bred orator, in pulpit or at bar. Hunter. The fourth edition. Edinburgh: Printed for Mr. Hunter, and sold by him at his academy, No. 28 High street. Price, five shillings. 1819. 43 pp. & 3 plates.

Insert, p. 97, *col.* 1:

Jefferies, R. Reporting; editing and authorship. Practical hints for beginners in literature. By R. Jefferies. London: John Snow & Co., 2 Ivy lane, Paternoster row. Swindon: Alfred Bull, printer, Victoria street. (1873?) 33 pp. 1s.

Insert, p. 97, *col.* 1:

Jones, Edward James. Improvements in the tenth edition of phonography, from the "Phonetic journal." A paper by E. J. Jones, of Rhodes, near Manchester. Sept. 1859. 16 pp. 1d.

—— Rough sketch of two schemes for improving the alphabet of Mr. Pitman's phonography, by Edward James Jones, Dalmonach house, Alexandria, Scotland. Printed for distribution at a meeting of the members of the Glasgow shorthand writer's association, held on Thursday

Jones, Edward James—Continued. evg. Feby. 8th, 1872. * * * Copyright. Entered at Stationers' hall. Lith. sheet 8 x 7 inches.

Substitute, p. 97, col. 2:

Jones, Edward James. Todd's Student's manual, written in accordance with the second edition of Jones's British phonography. Glasgow: Henry Finlayson, lithographer, 31 Argyle st. 1873. ii & 260 lith. pp.

Insert, p. 97, col. 2:

Jones, Henry. Jones' stenography—complete; or Bailey's first edition abridged, simplified and improved, by Henry Jones, professor of stenography, New York. January 27, 1845. Sheet 4 x 11 inches.
[Based on the system of Phinehas Bailey.]

Substitute, p. 97, col. 2:

Jones, John. Practical phonography or the new art of rightly speling and writing words by the sound thereof, and of rightly sounding and reading words by the sight thereof, &c.

Insert, p. 98, col. 1:

Kerin, Charles. Shorthand. London: Sherwood, Gilbert & Piper. 1836. 16 pp. & 2 plates. 1s.
[Taylor's alphabet.]

Insert, p. 99, col. 2:

Levy, Matthias. Shakespeare and shorthand, by Matthias Levy, author of "The history of shorthand writing." London: Jas. Wade, 18 Tavistock street, Covent garden, W. C. And of the author, 5 Mitre court, Fleet street. 1884. Price one shilling. 16 pp.

Substitute, p. 102, col. 2:

Lewis, James Henry. Extracts from the royal Lewisian system of short hand: taught at the "Grand institution," 113, Strand, nearly opposite Exeter Hall, where persons are prepared for law or parliamentary reporting, and where ladies and gentleman who wish to take down sermons, lectures, or speeches; verbatim, are taught to do so with ease and certainty, by characters as legible as common print. Invented and perfected by James Henry Lewis, founder of the Society of reporters, and practical

Lewis, James Henry—Continued. professor of the art; inventor and first teacher of the royal Lewisian systems of writing, arithmetic, book-keeping, and short-hand. * * * 25 pp. & 6 plates.

Insert, p. 102, col. 2:

Lindsley, David Philip. Prospectus of phonografied phonography. Harwinton, Litchfield Co., Conn. December 26, 1861. 4 pp.

—— Alphabet of phonografied phonography. Harwinton, Conn. 1861. 4 pp.: characters made with a pen. 10 cents.

—— Letters of instruction in phonografied phongraphy; by D. P. Lindsley. Hartford: steam-press of Elihu Geer, 16 State street. 1862. 10 printed pp. & 7 lith. plates.

Insert, p. 103, col. 2:

Livingstone, W. B. A new system of short-hand. By W. B. Livingstone, principal of the Berhampore college. (Copyright.) Published by W. B. Livingstone, Berhampore. [East Indies.] 1882. (Colophon:—Printed by J. W. Thomas, Baptist mission press, Calcutta.) 4 & 11 pp. & 4 fcap sheets.

Insert, p. 105, col. 1:

Longley, Elias. The phonographic teacher: showing how to teach and how to study phonography. Including the outlines of a lecture, suggestions as to forming classes, how to conduct lessons so as to make them interesting and profitable to both pupils and teacher. By Elias Longley. Cincinnati: Phonetic publishing company. 1885. 46 pp.

Insert, p. 105, col. 1:

Lowes, John D. Stenography, &c. 1883.

——— Second edition. London: Walter Scott, 14 Paternoster square, and Newcastle-upon-Tyne. 1884. 28 pp. incl. plates. Paper 1s.; cloth, 1s. 6d.

Substitute, p. 105, col. 2:

Lyle, William. Shorthand handbook; being shorthand made easy and useful. By William Lyle, (late a shorthand reporter,) author of "Government situations handbook," &c. A. M. Pigott, Aldine chambers, Paternoster row; and Kennington Park corner, London. 1856, 35 pp. & 4 plates.

Insert, p. 106, *col.* 1:

Macdougall, Duncan. Improved system of shorthand, &c.

—— Manchester: printed by Harrison & Crosfield. 1834. 14 pp. incl. 4 plates.

Substitute, p. 106, *col.* 1:

McEwan, Oliver. Helps to the study of phonography or phonetic shorthand. Complete Guide to the study of Pitman's Teacher, Manual and Reporter's companion, with notes, general rules, and papers of the Society of arts examination, by Oliver McEwan, F. S. Sc. principal, the New metropolitan school of shorthand, 323, High Holborn, London, W. C. London: Bemrose & Sons, 23, Old Bailey. F. Pitman, 20, Paternoster row. 1883. 6 d. 24 pp.

With this is bound

—— Helps to the study of phonography or phonetic shorthand. Part II. Guide to the study of the Manual and Reporter's companion (Pitman's), with notes, general rules, and papers of the Society of arts examination, by Oliver McEwan, F. S. Sc. author of "Principles of Phrasing," &c. Published at the New metropolitan school of shorthand, 323, High Holborn, London, W. C. 1863. 40 pp.

Insert, p. 106, *col.* 2:

McLaughlin. Stenographic short-hand. 1820. MS.

[In Edward James Jones' library]

Insert, p. 106, *col.* 2:

Mackenzie, Eneas. Shorthand made easy, &c.

—— —— London: Hardwicke, publisher, 192 Piccadilly. (1840?) 16 pp.

Insert, p. 106, *col.* 2:

McKnight, A., and Morgan, William E. Short-hand lesson sheets for self-instruction. Reporting style in twelve easy lessons. Designed for home study, and also for use in schools and colleges, doing away with the cumbersome work of text books, and rendering the study of short-hand comparatively easy. By A. McKnight and W. E. Morgan, practical reporters. Mailed complete to any address for $1.00. Philadelphia school of phonography. 1338—Chestnut street—1338. Philadelphia: McKnight & Morgan, publishers, 1338 Chestnut street. (1884.) 14 fcap pp.

Substitute, p. 106, *col.* 2:

Macro-stenography, &c. To which is subjoined the art of dactylology, or speaking with the fingers. Multum in parvo. London. Published by Sherwood, Neely & Jones, Paternoster row. And sold by all booksellers. 1813. 36 pp. & 3 plates.

[This work was written by William Mavor.]

MAINVILLE, A. See Pernin, A. J., and Mainville, A., p. 116, col. 2.

Insert, p. 107, *col.* 1:

Marrs' shorthand writer's pocket guide: being a new and improved system of stenography, whereby that art may be learned in a few hours, without the aid of a teacher. Tenth thousand. Glasgow: John S. Marr & sons, 194 Buchanan street. (About 1870?) 16 pp. 6d.

Substitute, p. 107, *col.* 1:

Marsh, Andrew J. Marsh's new manual of reformed phonetic short-hand; being a complete progressive guide to the best system of phonography and verbatim reporting. By Andrew J. Marsh, official reporter for the courts. San Francisco: A. L. Bancroft & Company. 1884. 119 pp. $2.

[The work was completed after the death of the author by C. F. Whitton.]

Substitute, p. 107, *col.* 1:

Mason, William. A pen pluck'd from an eagles wing. Or, the most swift, compendious, and speedy method of short-writing that ever was yet composed by any in this kingdom; is at length (through the blessing of God) brought to perfection, by the indefatigable industry of William Mason, authour and teacher of the said art. Omne bonum Dei donum. Licensed and entred according to order. London, printed by J. Darby, for the author, anno 1672. iv & 71 pp. 6¼ x 4 inches. Characters made with a pen.

[In the Bodleian Library.]

—— Arts advancement or the most exact, lineal, swift, short, and easy method of short-hand-writing hitherto extent, is now (after a view of all others, and above twenty years practice) built on a new foundation, & raised to a higher degree of perfection than was ever before attained to by any. In-

Mason, William — Continued.
vented & composed by William Mason teacher of the art, in Princes court in Loathbury, neare the Royal exchange; London. Where these books are to be had, & such as desire to learn, may (by him) be expediciously taught, at very resonable rates. The booke is also sold by these book-sellers. Mr. Benj: Alsop at the Angel & Bible, in the Poultry. Mr. Wilkins at y^{e} Starr in Cheap side. Mr. Jacob Sampson just wthin Ludgate. Mr. Thom: Fox in Westminster hall. And severall others. Price bound 1^{s}. 6^{d}. Printed for the author 1682. Ben: Rhodes sculpsit. Portrait, eng. title p. & 24 pp. eng. on one side of each sheet.

Insert, p. 109, *col.* 1:

Mavor, William. Universal stenography, &c.

—— —— Eighth edition by William Mavor, LL. D. London: printed for Longman, Hurst, Rees, Orme & Brown, Paternoster row. Price 7s. 6d. in boards.

Substitute, p. 109, *col.* 2:

Metcalfe, Theophilus. Short-writing, the most easie, exact, lineal, and speedy method that hath ever been obtained, or taught. Composed by Theophilus Metcalfe, author and professor of the said art. The last edition, with a new table for shortning of words. Which book is able to make the practitioner perfect without a teacher. As many hundreds in this city, and elsewhere, that are able to write sermons word for word, can from their own experience testifie. A young man, that lately lived in Cornhill, learned so well by this book, that he wrote out all the Bible in this character. London, printed for, and are to be sold by John Hancock, at the first shop in Popes-head-alley in Cornhil, at the sign of the three Bibles, 1679. 16 pp. & 19 plates.

Insert, p. 110, *col.* 2:

Miller, Adam. Laconography. Less than fifty letters and word signs to represent every word in the English language, as represented in this cut. (Chicago, Ill. 1884.) Sheet.
[Contains the alphabet of the system.]

—— The laconographic indicator, with a series of ten lessons in laconography, and a universal index by Adam Miller, M. D., Chicago, Ill. 1884.
[In press.]

Substitute, p. 110, *col.* 2:

Mitchell, John. Ars scribendi sine penna, or, how to take down verbatim, a week's pleading upon one page. A work of infinite importance to members of parliament, ministers of state, gentlemen of the law, physic, and divinity. London: printed, &c., for the author, in the year, 1782. Price five shillings. [MS. addition.] And sold by J. Bew, No. 28 Paternoster row. In four parts; a fifth part promised. 4 & 36 pp. & folding sheet: characters made with a pen.

Substitute, p. 111, *col.* 2:

Mitchell, John. Shorthand made easy. The elementary principles of shorthand, exemplified in a variety of easy lessons, by which a knowledge of that useful and elegant art is attainable in a few hours by the most common capacity: the whole founded on nature, grammar, and true philosophy. By an eminent shorthand writer. Second edition, for the use of schools and private gentlemen. London: printed for H. D. Symonds, No. 20 Paternoster row, and J. Owen, opposite Bond street, Piccadilly. 1794. Price two shillings and sixpence. 16 pp. & 9 plates.

—— —— Shorthand made easy. The elementary principles of shorthand exemplified in a variety of easy lessons. By an eminent shorthand writer. Fourth edition. London: H. D. Symonds. 1796. 16 pp. & 9 plates. 2s. 6d.

Insert, p. 111, *col.* 2:

Mitchell, Rev. Thomas. Another wonder of genius. A new system of telegraphic communication by the "Mitchell phonetic alphabet," which incorporates the vowels with the consonants by shading the latter. We thus combine short hand, telegraphy and the typewriter. The sound of the contracted words are sent by the Morse alphabet, read and printed by the typewriter, using less than half the number of letters in the words, as by the present system. Arranged and combined by Rev. Thomas Mitchell, Brooklyn, N. Y. (1883: copyrighted 1881.) 8 pp.

Insert, p. 113, *col.* 1:

Moran, Eldon. The reporting style of short-hand. A complete text-book of American phonography. To which is added a series of lessons on amanuensis, speech, legislative, and law reporting. By Eldon Moran, principal instructor State university of Iowa school of short-hand, and late official stenographer for the courts at Indianapolis, Ind. Designed for use in schools and colleges, and in connection with the author's perfected method of postal instruction. St. Louis: Christian publishing company. 1884. 184 pp.

—— —— Second edition. St. Louis: Christian publishing company. 1884. 184 pp.

—— The short-hand sign-book. A manual of word and phrase signs. Arranged alphabetically and in lessons. By Eldon Moran, principal instructor State university of Iowa school of short-hand, and author of the new stenographic instruction book, the "Reporting style.' Published by the author, Iowa city, Iowa. Copyright 1884, by Eldon Moran. 47 pp.

—— Manual, containing the rules and an explanation of the methods of teaching employed in the department of postal instruction, State university of Iowa school of short hand, by Eldon Moran, principal instructor, and author of an instruction book on the reporting style. Iowa City: published by the author. 1885.

[In press.]

—— Trial lessons, by means of which the student may test his fitness for stenography. Made use of in connection with the department of postal instruction, State university of Iowa school of short-hand. By Eldon Moran. Iowa City. 1885.

[In preparation.]

—— Circulator series, a graduated list of stenographic exercises used in the department of postal instruction, State university of Iowa school of shorthand, by Eldon Moran. Iowa City: published by the author. 1885.

[In preparation.]

Insert, p. 114, *col.* 1:

Needham, Clement R. The diamond shorthand. Tenth edition. C. R. Needham, 15 Mary st., Palace road, Lambeth, S. E. [London.] n. d. Sheet.

—— —— Eleventh edition. n. d. Sheet.

Substitute, p. 115, *col.* 1:

Newman, Henry. Aids to short-hand writing comprising arbitraries, prefixes, terminations, &c., adapted to all systems of stenography; also short-hand maxims; by Henry Newman. Printed for the author, by Thomas Hall, 4a, Windmill street, Gravesend. (1869.) 16 pp. $5\frac{1}{4}$ x $4\frac{1}{4}$ inches.

Insert, p. 115, *col.* 1:

New (A) treatise on short hand, reduced to so plain, easy and concise a method that any person by a few days application may make himself master of this useful art. London. Printed for E. Hedges N°. 92. Cornhill. (Price one shilling and sixpence.) [Colophon:—Published according to act of parliament, and sold by William Davis N°. 25, Ludgate hill. Price 1s. 6d.] (About 1800.) Eng. title on cover & 8 eng. pp. printed on one side of the paper.

Insert, p. 115, *col.* 1:

New York state law stenographers" association, constitution, by-laws, &c. Adopted August 20th, 1876, Syracuse, N. Y.: Standard publishing company. 1876. 12 pp.

Insert, p. 115, *col.* 2:

New York state stenographers' association. Proceedings of the New York state stenographers' association, including papers read, etc., at the ninth annual meeting, held at the Laurel House, Greene Co., N. Y., August 19th, 1884. Troy, N. Y.: Troy press book publishing house, 225 River street. 1884. 114 pp.

Insert, p. 116, *col.* 1:

North, W. S. Popular edition of Gurney's shorthand (revised and improved). The only system officially used in the two houses of parliament. By W. S. North, professional shorthand writer. Can be learned in a week, and written with ease and rapidity in three months. An unlimited course of instruction through the post, half-a-guinea. September, 1884. Bradford, Yorks. (On paper cover: Inman, printer, Leeds. Entered at Stationers' hall.) 16 pp. 6d.

Insert, p. 116, *col.* 2:

Odell, George. Odell's improved system of shorthand, by which the nature of taking down sermons, lectures, trials, &c., may be acquired in a few hours without the aid of a master. Fourth edition. London: published by R. Groombridge, 6 Panyer-alley, Paternoster row; G. Cowie, 312 Strand; G. Purkess, Old Compton street, Soho; and G. Odell, 69 King street, Golden square. 1833. 16 pp. & 4 plates.

—— —— Twenty-first edition. London: published by G. Odell, 18, Princes-street, Cavendish-square; and R. Groombridge, 6, Panyer-alley, Pater-noster-row. 1839. 16 pp. & 4 plates. 8d.

Substitute, p. 117, *col.* 1:

Odell, George. The new testament of our Lord and Saviour Jesus Christ. In Taylor's system of short-hand, as improved by George Odell. London: George Odell, 18, Princes street, Cavendish square; and R. Groombridge, 5, Paternoster row. (1843.) Lith. title p. & 290 lith. pp. & 1 plate. Cloth 15s.

Insert, p. 117, *col.* 1:

Ohio stenographers' association. Proceedings of the first annual session of the Ohio stenographers' association. Held at Cleveland, O. Tuesday, August 14th, 1883. Toledo, Ohio: Barkdull printing house, 1883. 76 pp. 25 cents.

—— Proceedings of the second annual session of the Ohio stenographers' association, held at Dayton, Ohio, Tuesday and Wednesday, August 12th and 13th, 1884. Dayton, Ohio: Journal book and job printing house. 1884. 66 pp. 50 cents.

Insert, p. 117, *col.* 2:

Osgoodby, William W. Phonetic shorthand. A method for self-instruction. By William W. Osgoodby, for twenty-two years official stenographer of the New York supreme court: Rochester, N. Y.: published by William W. Osgoodby. 1884. 56 pp.

P., J. See Pickles, John.

Insert, p. 118, *col.* 1:

Palling, F. Writers' time preserver; or the giver of more time. By F. Palling. London: Simpkins & Co. Buck and Wootton, Lambeth; David Batten, Clapham Common, S. (1857.) vi & 28 pp. & two-page plate. 1s. [At end of preface "Lambeth, 1857."]

P. 118, *col.* 2:

Parker, William. A new system, &c. Add: Entered according to act of Congress in the year 1873.

Substitute, p. 118, *col.* 2:

Parkhurst, Henry M. A phonographic vocabulary. From P to D inclusive. (Fluent style) By Henry M. Parkhurst. 1849. 12 eng. pp. numbered 13–24.

Insert, p. 119, *col.* 2:

Penny (The) system of stenography; or shorthand simplified for general use, compiled principally from the celebrated system of Dr. Taylor, with a simple and improved arrangement of its arbitraries, rendering it more perfectly readable than shorthand has generally been found by the beginner. London: T. Ward and Co., Paternoster row, and all booksellers. (1842.) Quarto sheet.

Insert, p. 120, *col.* 1:

Pettigrew, William. The guide to verbatim reporting. A system of shorthand based on the phonetic principle. Compiled by William Pettigrew, Glasgow. Price one shilling. (1864.) 4 & 54 pp.

[The preface is dated: "7 Craigneстock place. October 19th, 1864."]

Insert, p. 120, *col.* 1:

Phonetic society, list of, for 1884. With alphabetical arrangement of names, and lists of phonetic shorthand associations, shorthand magazines published monthly, and evercirculators. Price 2d.; post free 2½d. London: F. Pitman, 20 & 21, Paternoster row. Bath: Isaac Pitman, Phonetic institute. (1884.)

Insert, p. 120, *col.* 1:

Phonographic alliance. Supplement to the second annual report of the phonographic alliance, containing the standard logograms, phraseograms, and contracted words which were sanctioned by a special committee of the alliance, at a conference held in London Dec. 30th and 31st [18] 64, under the presidency of Mr. T. A. Reed, who has revised the whole. Recommended to phonographers as a most effectual means

Phonographic alliance—Continued. for promoting uniformity of writing, and securing the stability of phonography. ☞ This supplement can only be obtained from the secretary of the alliance, Henry Boothey, Gainford academy, Darlington. Any number sent free for one postage, and the advertised price. Glasgow: A. Steele & Co., lithographic printers, &c., 95 Hutcheson street. 1865. Price 1d. (gratis with second annual report.) Post free 2d. 8 lith. pp.

PHONOGRAPHIC student. See Todd, Frederick.

Insert, p. 120, *col.* 1:

Phonographic (The) teacher, &c.

—— —— A prize essay on the best method of teaching Pitman's phonography. By Sunergos. In the corresponding style of phonography. Fourth edition. London: Fred. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute, Parsonage lane. 1871. 64 lith. pp.

Insert, p. 120, *col.* 2:

Phonography. Works printed in Isaac Pitman's system of phonography, &c.

Bible (The Holy).

—— —— Another edition. London and Bath. 1872.

Insert, p. 121, *col.* 1:

Blackie, John Stuart. On self-culture, &c.

—— —— Another issue. 1882.

Insert, p. 121, *col.* 1:

Book (The) of common prayer, printed in an easy reporting style of phonography. London: Fred. Pitman, 20 Paternoster row. Bath: Isaac Pitman, Parsonage lane. 1871. Colophon: Lithographed by John Rogers Lloyd, for Isaac Pitman, Bath, 10 January, 1871. 443 pp.

Insert, p. 121, *col.* 2:

Book (The) of psalms. In phonetic short hand. See Manual of phonography, 8th edition. London: Fred. Pitman, Queen's Head passage, Paternoster row. 1849. Colophon in short hand: Lithographed by Isaac Pitman, July, 1848. 64 lith. pp. Paper 1s.; cloth, 2s.

Book (The) of psalms. 1876.

—— Another issue. 1881.

Phonography—Continued.

Insert, p. 121, *col.* 2:

Bulwer, Edward Lytton. Paul Clifford, in shorthand. London: F. Pitman, 20 & 21, Paternoster row. 1884. 4s. 6d.

Insert, p. 122, *col.* 1:

Debate on the Irish church bill in the House of lords, 14th, 15th, 17th, and 18th June 1869. In reporting. London: F. Pitman, Phonetic depot, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic Institute. 1869. 172 lith. pp.

Insert, p. 122, *col.* 2:

Flowers of poetry. London: Fred Pitman, Phonetic depot, 20 Paternoster row. 1850. 32 pp. 6d.

Gospel (The) by St. Matthew. Lithographed in phonetic shorthand by T. A. Reed. London: F. Pitman, 20, Paternoster row. T. A. Reed, 37 Cursitor street, Chancery lane. Price one shilling. 64 lith. pp.

Insert, p. 123, *col.* 2:

Irving, Washington. Tales and sketches, by Washington Irving. In the corresponding style of phonography. London: F. Pitman, 20 & 21 Paternoster row. Bath: Isaac Pitman, Phonetic institute. 1884. 96 eng. pp. with key at bottom of each page. Paper 1s.; cloth, 1s. 6d.

Insert, p. 124, *col.* 1:

Macaulay, Thomas Babington. Biographies by Lord Macaulay, contributed to the Encyclopædia Britannica. With notes of his connection with Edinboro, and extracts from his letters and speeches. Written in the reporting style of phonography, with key in phonetic spelling. Printed by permission of the proprietors, Messrs. A. and Ch. Black, Edinboro. London: Fred. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute. 1868. 199 pp. (16-199 lith.) & 199 pp. letterpress.

Insert, p. 124, *col.* 2:

New Testament (The) of our Lord and Saviour Jesus Christ. In phonography. London: F. Pitman, 20, Paternoster row. 1867. (Colophon in shorthand characters.) Lithographed and printed by James Butterworth. 1867. ii & 496 lith. pp.

Phonography—Continued.

New Testament (The) of our Lord and Savior Jesus Christ. In phonography. London: F. Pitman, 20, Paternoster row. n. d. (188-.) 318 lith. pp. Roan 4s.; morocco, 8s.

Substitute, p. 124, col. 2:

Pentateuch (The), or five books of Moses, written in phonetic shorthand, in the various styles of the art,—learner's, business, corresponding, and reporting,—each opening of the book displaying one style. London: Fred. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute, Parsonage lane. (1866.) 157 lith. pp.

Insert, p. 125, col. 1:

Scott, Walter. Ivanhoe. London: F. Pitman, 20 & 21 Paternoster row. 1885.

Insert, p. 125, col. 1:

Sermon (The) on the mount. Matthew, ch. 5, 6, 7. In phonography, written in an easy style for learners. London: Isaac Pitman, Phonetic depot, 1 Queen's Head passage, Paternoster row; Bath: Phonetic institution, 5 Nelson place. Sold by all booksellers. 1846. Price 3d. 16 lith. pp.

Insert, p. 125, col. 1:

Shakespeare, William. Pearls from Shakspeare: in the corresponding style of phonography. London: F. Pitman, 20, Paternoster row, E. C. 112 lith. pp.

Insert, p. 125, col. 2:

Swedenborg, Emanuel. Heaven and its wonders; from things heard and seen. By Emanuel Swedenborg. Translated by the Rev. Samuel Noble. Centenary edition, in shorthand. London: Fred. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute, Parsonage lane. 1872. xlviii & 272 lith. pp.

Swift, Jonathan. Gulliver's voyage to Lilliput. By Dean Swift. Printed in the corresponding style of phonography. By Isaac Pitman. London: Frederick Pitman, 20 Paternoster row. Bath: Isaac Pitman, Phonetic institute. 1883. 92 pp. Paper, 1s.; cloth, 1s. 6d.

Insert, p. 125, col. 2:

Pickles, John. [All rights reserved.] Reporting simplified. Graphic shorthand. A new system, easy to read and write, without either vowel-marks, or thick-and-thin strokes. By J. P******. Price sixpence. Printed for, and published by, the author. Sold by booksellers. C. H. Barnwell, printer, Savile-st., Hull. (1884.) 16 pp. letterpress & 8 pp. lith. plates.

[Written and published by John Pickles, 54 Mytongate, Hull.]

Insert, p. 126, col. 2:

Pitman, Benn, and Howard, Jerome B. The manual of phonography. By Benn Pitman and Jerome B. Howard. Cincinnati: Phonographic institute. 1885. 144 pp.: partly relief copper plate. Cloth $1.00; bds. $0.80.

Insert, p. 127, col. 1:

Pitman, Frederick. A phonographic tartar: London: F. Pitman, 20, Paternoster row, E. C. 8 lith. & 6 letterpress pp. 3d.

[An exercise on difficult words.]

—— How to get speed in shorthand. By F. Pitman, editor of the "Shorthand magazine." London: F. Pitman, 20 & 21, Paternoster row, E. C. (1884.) 45 pp. & 2 plates. Paper 6d.; cloth, 1s.

—— See Some proposed changes, &c.

Substitute, p. 127, col. 1:

Pitman, Henry. Hints on lecturing, and notes on the history of shorthand, elocution, phonography, music, logic, the establishment of the penny post, and paper making. By Henry Pitman. London: Frederick Pitman, 20 Paternoster row. Bath: Isaac Pitman, Phonetic institute. Manchester: Henry Pitman, 41 John Dalton street. 1879. 140 pp. paper 1s.; cloth, 1s. 6d.

Insert, p. 127, col. 2:

Pitman, Isaac. A manual of phonography; or, writing by sound; a natural method of writing by signs that represent the sounds of language, and adapted to the English language as a complete system of phonetic shorthand. By Isaac Pitman. With an appendix on the application of phonography to foreign languages. By A. J. Ellis, B. A.

Pitman, Isaac — Continued.
London: Samuel Bagster & sons, 15 Paternoster row. Bath: Isaac Pitman, Phonographic institution, 5 Nelson place. 1845. 64 & 36 pp. 2s.

Insert, p. 128, *col.* 2:

Pitman, Isaac. A manual of phonography, &c.

—— —— Four hundred and thirty-eighth thousand. London: Fred. Pitman, Phonetic depot, 20 Paternoster row, E. C. Bath; Isaac Pitman, Phonetic institue. 1885. (Entered at Stationers' hall.) 64 pp. 1s. 6d.

Substitute, p. 128, *col.* 2:

Pitman, Isaac. The reporters' book, or, phonography adapted to verbatim reporting. Published by Isaac Pitman, at the phonographic institution, 5, Nelson place, Bath; also, by S. Bagster & sons, 15, Paternoster row, London: and sold by all booksellers. 1843. 36 printed and lith. pp. 2s.

Insert, p. 129, *col.* 1:

Pitman, Isaac. The phonographic reporter or reporter's companion, &c.

—— —— One hundred and eighteenth thousand. London and Bath. 1884. 96 pp. 2s. 6d.

—— Exercises in phonography. Contents: The Lord's prayer, Psalms 67, 100, and 145, 1 Samuel, chap. 3, and essay on conversation. London: Samuel Bagster & sons, 15 Paternoster row. Bath: Isaac Pitman, 5 Nelson place. 1842. 8 pp. 3d.

—— —— Exercises in phonography, &c.

—— —— Fortieth thousand of the eighth edition. London and Bath. 1849. 32 pp.

Insert, p. 129, *col.* 2:

Pitman, Isaac. Exercises in phonography, &c.

—— —— One hundred and sixty-fifth thousand. London and Bath. 1882. Price one penny. 16 pp. 1d.

—— —— Two hundredth thousand. London and Bath. 1884. 16 pp.

—— The phonographic copy-book; designed to conduct the learner, in three lessons, to an acquaintance with the principles and practice of phonography; or, writing by sound: a new system of shorthand. By Isaac Pitman. Second thousand. London: Samuel Bagster & sons, 15 Paternoster row. Bath: Isaac Pitman, 5 Nelson place. Sold also by all booksellers. 1842. Price sixpence. 16 pp.: interleaved with ruled paper.

Insert, p. 130, *col.* 1:

Pitman, Isaac. The phonographic teacher, &c.

—— —— Tenth edition. Two hundred and eightieth thousand.

Insert, p. 130, *col.* 2:

Pitman, Isaac. The phonographic teacher, &c.

—— —— Revised edition. Eight hundred and sixty-ninth thousand. London and Bath. 1884. 6d.

—— —— Revised edition. Nine hundred and twenty-fourth thousand. London and Bath. 1884. 6d.

Insert, p. 131, *col.* 2:

Pitman, Isaac. The reporter's assistant and the learner's guide to a knowledge of phonography: a key to the reading of the reporting style of phonography, and a course of lessons for learners in shorthand outlines. By Isaac Pitman. Third edition. London: F. Pitman Phonetic depot, 20 Paternoster Row, E. C. Bath: Isaac Pitman, Phonetic institute. 1885. (Entered at Stationers' hall.)

Insert, p. 132, *col.* 1:

Pitman, Isaac. Key to the phonographic teacher and to the exercises, &c.

—— —— Another issue. 1884. 40 pp. 6d.

—— Pitman v. Hine. Report of the trial of an action at law by Isaac Pitman, Bath, against Thomas Hine, 146 Gloucester road, London, N. W., for an infringement of the Copyright act, 5 and 6 Victoria, c. 45, tried at the royal courts of justice, Queen's bench division, before Mr. Justice Mathew, on the 4th, 5th, and 6th November, 1884. * * * Transcript of the shorthand notes of Messrs. T. A. Reed and Co., 37 Cursitor street, Chancery lane, London. London: F. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, phonetic institute. 1884. Price one penny. 32 quarto pp.

Substitute, p. 132, *col.* 1:

Pitman, Isaac. Grammalogues and contractions. London: F. Pitman. 8 pp. 2d.

—— The phonographic legal phrase book. London: F. Pitman. 1882. 20 pp. 6d.

Insert, p. 132, *col.* 1:

Plumb, W. The alphabet of language! Consisting of simple consonantal signs of the same thickness: with fifteen vowel signs; or stenography, phonography, phonotype and shorthand made easy; easily written, and as easily read. A new system, capable of the greatest abbreviation and the most perfect legibility; a book for the million! For the minister, the missionary, the day and Sunday school teacher, the clerk, the reporter, and all those who have little time and weak memories; also for the blind. Not a book of rules and arbitrary characters, but of principles clearly explained, and elucidated by examples. By W. Plumb. London: W. Strange, 21 Paternoster row; John M'Combe, Glasgow; Abel Heywood, Manchester; J. Shepherd, Liverpool; Webb and Co., Leeds; and R. Allen, Nottingham. Price sixpence. 12 pp. & 4 plates.

Insert, p. 133, *col.* 1:

Pocknell, Edward. Timothy Bright's, or the first English shorthand, 1588. A paper read by Edward Pocknell, before the shorthand society, Feb. 6th, 1884. (Reprinted from "Shorthand," May, 1884.) 8 pp. Price 6d.

PROGRESSIVE studies in phonography. See Turner, T. A.

Substitute, p. 134, *col.* 1:

Pterygraphy, or, the flying pen, being a new and simplified system of short-hand writing, by means of which any person may acquire a perfect knowledge of this useful art; so as to commit literally to paper, trials, pleadings, speeches, lectures, sermons, plays, &c. &c. without the assistance of a teacher; or may even read what has been written by others. Brevis esse laboro. London: printed for B. H. Brown, 37, Leadenhall-street. 1802. Entered at Stationers' hall. Ruffy

Pterygraphy—Continued.

and Evans, printers, 27, Leadenhall-street. Frontispiece, 8 pp. & 9 eng. plates.

Insert, p. 135, *col.* 1:

Reed, Thomas Allen. The phonographic phrase book, a general explanation of the principle of phraseography; or, the writing of entire phrases without lifting the pen. As applied to Pitman's phonetic shorthand: with several thousand illustrations. By T. A. Reed, editor of the "Phonographic reporter." London: F. Pitman, 20, Paternoster-row; T. A. Reed, 6, Southhampton buildings. Bath: Isaac Pitman, Phonetic institution. 1855. 64 lith. pp.

Insert, p. 135, *col.* 2:

Reed, Thomas Allen. A reporting exercise containing all the phonographic grammalogues and contracted words employed in the compiler's practice. By Thomas Allen Reed. Second edition. London: F. Pitman, 20 Paternoster Row. (1868).

—— A reporting exercise, containing the grammalogues and contracted words in phonography in the form of an imaginary speech. By Thomas Allen Reed. Fifth edition. London: F. Pitman, 20 Paternoster row. Reed & Co. Cursitor st. E. C. 32 lith. pp. 1882.

—— Leaves from my note-book. A facsimile of shorthand notes taken by T. A. Reed, editor of "The phonographic reporter." London: F. Pitman, Paternoster Row. Reed and Co., 37, Cursitor street, Chancery lane. 1880. Price 6d.

Insert, p. 136, *col.* 1:

Reed, Thomas Allen. Duployé's shorthand. By T. A. Reed. Reprinted from the "Phonetic journal" for 5th and 12th May, 1883. (Printed by Isaac Pitman, Bath.) 16 pp. 1d.

—— Leaves from the note-book of Thomas Allen Reed. Printed in the reporting style of phonography. Vol. I. London F. Pitman 20 & 21 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute. 1884. Portrait & 189 shorthand pp. with printed key at foot of each page. Paper 2s.; cloth 2s. 6d. [Vol. II will shortly be printed.]

Reed, Thomas Allen — Continued.

—— See Phonography. Gospel of St. Matthew and Reporter's (The) hand-book.

Insert, p. 136, *col.* 1:

Rees, Thomas. A new system of stenography, or shorthand by which persons of all capacities may make themselves perfect masters of that elegant and useful art in a much shorter time than by any other treatise ever published. Particularly recommended to gentlemen educating for the bar, the senate, or the church. By Thomas Rees. Fourth edition. London: printed for T. N. Longman, N°. 39 Paternoster row. (1796.) 12 pp. & 3 plates. 2s.

Insert, p. 136, *col.* 2:

Reporter's (The) hand-book, and vade mecum, with appendix. By a reporter experienced on weekly and daily newspapers. Affording comprehensive instructions for reporting all kinds of events. Revised by T. A. Reed. London: F. Pitman, 20 and 21, Paternoster row, E. C. (1884.) 96 pp. interleaved.

Insert, p. 137, *col.* 1:

Rich, Jeremiah. The penns dexterity By theise incomparable contractions by which a sentence is writt as soone as a word Allowed by authority and past the two universitys with greate aprobation and aplause. Invented and taught by Ieremiah Rich, 1659. [Dedication.] To the right honorable the lady Mary Rich, Jeremiah Rich dedicates his Penns dexterity. [Imprint.] Entered according to order ☞And are to be sould by Samuel Botley over against Vintners hall in Thames street London and no where els. Sheet 16¼ x 10¾ inches, containing portrait, title, alphabet, table of ideas, the ten commandments, &c.
[In the Bodleian library.]

—— The pen's dexterity: or, the art of short-writing improved, by incomparable contractions, whereby a sentence is writ as soon as a word. Allow'd by authority, and past the two universities with great applause. Invented and taught by Jeremiah Rich. Thus either sex or age may (old or young) With nimbler pen out-post the nimble tongue. Thus, to thy lasting fame, it shall be said, Rich lives in characters, tho' Rich be dead. London, printed for John Marshall, at the Bible in Gracechurch-street; where is also sold Mr. Rich's New Testament and Singing-Psalms, of great advantage to learners. (About 1680.) Portrait, letterpress title, and 15 pp. plates, engraved by Tho: Burnford.

—— —— London: printed for John Marshall, at the Bible in Gracechurch street; where is also sold Mr. Rich's New Testament and Singing Psalms, of great advantage to learners. (About 1690.) Letterpress title p., verso blank, 2 pp. letterpress & 18 pp. plates: in all 11 leaves.
[The plates of these editions appear to have been engraved for the sheet edition of 1659, mentioned in the first column.]

Substitute, p. 138, *col.* 2:

Ritchie, Wallace. Extract from the Pilgrim's progress; translated into Ritchie's system of abbreviated long-hand. London: printed by W. H. & L. Collingridge, 117 to 120, Aldersgate street. Price one shilling. 8 pp.

Insert, p. 139, *ol.* 1:

Rockwell, Julius Ensign. Circulars of information of the Bureau of Education. No. 2—1884. The teaching, practice, and literature of shorthand, by Julius Ensign Rockwell, stenographer. Washington: Government printing office. 1884. 160 pp. & folding plate equivalent to 10 pp.

Insert, p. 140, *col.* 2:

Scovil, W. E. Scovil's stenography and phonography. The fourth edition improved. 1855. n. p., n. d. 12 pp.: characters made with a pen.

—— Shorthand.
[The edition published at Kingston, N. B., in 1866, contained 6 & 80 pp., incl. plates, the price being 75 cents.]

Insert, p. 141, *col.* 1:

Shelton, S. Brachygraphy, or the art of short-writing: in a more exact, easie, and speedy method than hath been yet published to the world. Which is so accommodated to the meanest capacity that the learner may in a very short time be perfect in the art without a teacher. By S. Shelton. London, printed for Peter Parker, at the first

Shelton, S.—Continued.
shop in Popes-head-alley, on the right hand going out of Cornhill, 1672. Portrait, 16 pp. & 12 plates.

Substitute, p. 141, *col.* 1:

Shelton, Thomas. Tachy-graphy. The most exact and compendious methode of short and swift writing that hath ever yet beene published by any. Composed by Thomas Shelton, author and professor of the said art. Approued by both vnyuersities. Ps. 45, 1. My tongue is as the pen of a swift writer. 1641. (London.)

Substitute, p. 142, *col.* 1:

Shelton, Thomas. Zeiglographia, or a new art of short-writing never before published. More easie, exact, short, and speedie then any heretofore. Invented & composed by Thomas Shelton author and teacher of y^e^ said art Allowed by authoritie London Printed by M. S. and are sold at the authors house in Bore's-head court by Cripple-gate 1659 Eng. title p., 8 & 56 (?) pp. & plate.

Insert, p. 142, *col.* 1:

Shelton, Thomas. Tachy-graphia sive exactissima & compendiosissima breviter scribendi methodus. Primitus composita in lingua Anglicana, per Thomam Shelton utilissimæ illius artis authorem. Et jam in publicum totius Europæ usum Latine edocta loqui Tachy-graphes liber est parvus, sed fructus in illo Non parvus, parva hœc virque puerque pete? Londini: excudebat Tho Creake, 1660 Portrait, 16 & 3 pp. & 20 plates.

Substitute, p. 142, *col.* 1:

Shelton, Thomas. The whole book of Psalms in meeter according to that most exact & compendious method of short writing Composed by Thomas Shelton (being his former hand) aproved by both vniversities & learnt by many thousands. Sold by Iohn Clarke at Mercers chappell in cheap-side T: Cross sculpsit (About 1660.) Portrait, eng. title p., verso blank, 2 pp. text "To the reader," & 202 eng. shorthand pp. $1\frac{1}{4}$ x $2\frac{3}{8}$ inches.
[In J. E. Rockwell's library.]

Insert, p. 142, *col.* 2:

Short, G. and W. A new system of shorthand. (Published in England about 1840.) Card.

Insert, p. 142, *col.* 2:

Shorter, Robert. Plain instructions for acquiring Gurney's short hand; with examples of reporting in the English, Latin, and French languages. By Robert Shorter, law reporter. A new edition. London: published by Henry Kent Causton & son, 4, Laurence Pountney hill, Cannon street. 100 pp.: pp. 20–100 lith. (184–) 1s.

P. 143, *col.* 2:

Sidney, J. The reporters shorthand improved, &c.

Colophon:—Printed by W. Upcroft, Magdalen street, Norwich.

Substitute, p. 143, *col.* 2:

Sigston, W. H. A synopsis of stenography. By W. H. Sigston, Queen square academy, Leeds. Leeds: published by Baines and Newsome, and Simpkin and Marshall, London. (1832.) Sheet. 5s.

Insert, p. 143, *col.* 2:

Simson, James. [Entered at Stationers' hall.] Compend of syllabic shorthand: being a synopsis of the system, prepared by the author, James Simson, secretary of the S. S. A. Ayr: Shorthand institute. 1881. 4 pp.: title on cover.

—— Syllabic shorthand, &c.

—— —— Second edition. 1884.

Substitute, p. 143, *col.* 2:

Singleton, James. The shorthand student's assistant: an arrangement of lessons in the principles of the art of phonography as developed in the text books, by James Singleton, (teacher of phonography, member of the Phonetic society, &c.) Leeds: Inchbold & Beck, 33, Bond street. 1876. Price one penny. 7 pp.

—— —— Second edition. Leeds: G. H. Robinson, phonetic bookseller, 17, Market street, Briggate. 1881. Price one penny. 7 pp.

Insert, p. 143, *col.* 2:

Sloan-Duployan phonography. Reply to T. A. Reed's criticism. Reprinted

Sloan-Duployan phonography — Cont'd. from the pamphlet published by the Sloan-Duployan shorthand association, 192 Hope street, Glasgow. (1883.) Price one penny. 16 pp.

—— Revolution in shorthand. A new era in English phonography. Sloan's Duployan (from the French). Pamphlet (with specimen) one penny. London, W. C., 16 Southampton row. (1884.) 12 pp.

Insert, p. 143, *col.* 2:

Sloan, J. M. The Sloan-Duployan phonographic instructor. The simplest, most legible, and briefest shorthand method in the world. Published by J. M. Sloan of the Institut Stenographique des Deux Mondes of Paris; president of the Sloan-Duployan phonetic society. Fifth edition. London, 1884. (Head offices — 16 Southampton row, W. C.) 30 pp. 2s.

[The preface states that the first edition was published in 1882.]

—— Reporters' rules and abbreviations. The Duployan system. The simplest, most legible, and most rapid shorthand method in the world. Published by J. M. Sloan, member of the Institut Stenographique des Deux Mondes of Paris; president of the Duployan club. Fifth edition. Dublin: printed by W. Leckie & Co., 59 Bolton street. 1883. 31 pp. 2s. 6d.

—— Sloan's Duployan phonography. Simplest, most legible, and most rapid shorthand method in the world. Exercises on the "R" rule. Published by J. M. Sloan, of the Institut Stenographique des Deux Mondes of Paris; president of the United Kingdom Duployan society, etc. London, 1884. 31 pp. 1s. 3d.

Insert, p. 144, *col.* 2:

Some proposed changes in Mr. Pitman's phonography. London. 16 pp. Colophon :—London : printed at London by Strangeways & Walden, Castle street, Leicester square.

[Authorship attributed in British Museum catalogue to Frederick Pitman.]

Substitute, p. 146, *col.* 2:

Stoddart, H. R. The legal shorthand reiter. Bei H. R. Stoddart. A legal fraze buk for the use ov shorthand klarks is apended bei Eizak Pitman. Reformd speling. London: F. Pitman, 20 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute. 1882. 48 pp.

Stone, James W. See Graham, Andrew J.

Insert, p. 147, *col.* 1:

Sumner, Charles A. Popular use and benefits of standard phonography. A lecture by Charles A. Sumner, (reporter for the county courts of San Francisco.) With an appendix. San Francisco: Bacon & Company, steam book and job printers, Clay street, below Montgomery. 1873. Price, 15 cents. 16 pp.

—— Popular uses and benefits of standard phonography. New York: A. J. Graham. 15 cents.

Insert, p. 147, *col.* 2 :

System (A) of short hand writing.

[Pp. 173–184 of Something new, &c. By M. H. Barton. Boston, Mass. 1833. See p. 66, col. 2.]

Substitute, p. 148, *col.* 2 :

Taylor, Samuel. An universal system of stenography, &c.

—— —— The fifth edition: to which is now added, a new plate of all the terminations at one view. London: printed by J. F. Dove, St. John's square, for W. Baynes, 54, Paternoster row. 1814. 48 pp. & 11 plates.

Substitute p. 149, *col.* 1:

Tear, Laming Warren. One step further in stenography, by Laming Warren Tear. * * * London: John Van Voorst, 3, Paternoster row. 1834. 12 pp. & 11 plates.

Templeton, P. B. Six lessons on shorthand; with observations and advice, as to the practice of the art, the different classes of speakers whom a writer may have to follow, and the best and cheapest materials to use in writing. London: W. S. Orr & Co., Amen corner, Paternoster row. Manchester: Banks & Co., St. Ann's square; A. Heywood, Oldham street, and may be had of all book-sellers. 1840. 24 pp. & 8 plates. 2s. 6d.

Insert, p. 149, *col.* 2 :

Thompson, John. Shorthand, and how to learn it, &c.

Thompson, John — Continued.

—— —— Second edition. Edinburgh: E. & S. Livingstone, educational booksellers, 67 South bridge. Glasgow: John Pryde, educational bookseller, 369 Sauchiehall street. London: Simpkin, Marshall, & Co. 1876. 40 pp. 6d.

—— —— Revised and greatly improved. Edinburgh: John Thompson, 44 Alva place, and Ogle & Murray, 16 Forrest road. 1884. (On cover:—Price 8d. By post, 9d; or, with shorthand filled in, 2s. 6d.) 40 pp.

Insert, p. 150, *col.* 1:

Todd, Frederick. The phonographic student: a series of progressive lessons illustrating Pitman's "Manual of phonography" with corresponding exercises suitable for dictation; and an appendix containing rules for writing. London: F. Pitman, 20 & 21 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute. 1884. Entered at Stationers' hall. 30 pp.: appendix 2 pp. 6d.

Insert, p. 151, *col.* 1:

Turner, T. A. Progressive studies in phonography. A simple and extended exposition of the principles of the art of phonetic shorthand as set forth in "The phonographic teacher," "The manual of phonography" and "The reporter," intended for the use, principally, of self-taught students. Reprinted from "The phonetic journal" for September, October and November, 1884. London: F. Pitman, 20 & 21 Paternoster row, E. C. Bath: Isaac Pitman, Phonetic institute. 1884. 104 pp. 1s.

P. 151, *col.* 2:

Tyson, A. G. The students' friend. A new and philosophical system, &c.

Add after By A. G. Tyson: Schoolmaster & private teacher, 33, West-gate, Scarborough. Printed and published by J. Ainsworth and Sons; and sold by the author & booksellers in general. Scarbro'. 1838. 51 pp. & plate 2s.

Substitute, p. 152, *col.* 2:

Wailes, Robert. Supplement to the Reporter's manual of phonographic shorthand, containing rules and examples for verbatim reporting. London: Simpkin, Marshall & Co. 1875. 55 pp. incl. plates. 1s. 6d. sewed.

Insert, p. 152, *col.* 2:

Walford, Cornelius. Address on the opening of the first session of The shorthand society of London. 1st November, 1881. By Cornelius Walford, barrister-at-law, first president. (London. 1881.) 8 pp.

—— Address on the opening of the second session of "The shorthand society." By Cornelius Walford, F. I. A., F. S. S., F. R. Hist. S., barrister-at-law, president. (London. 1882.) 7 pp.

Substitute, p. 152, *col.* 2:

Walker, R. Bailey. English gleanings: a graduated system of exercises for the use of those who desire to attain stenographic accuracy, swiftness, and success. By R. Bailey Walker, Sharpe street, Prestwich, reporter, teacher of phonography at the Manchester commercial schools, the Manchester Athenæum, the Manchester Mechanics' Institution, &c., &c. Price threepence; may be had from the author. Manchester: Beresford & Havill, printers, 36 Corporation street. 1870. 12 pp.

Insert, p. 152, *col.* 2:

Walton, Joseph. (Lessons in shorthand, for the use of his scholars.) MS. (16—.) 24 pp.

[In the Watkinson library, Hartford, Conn.]

Insert, p. 153, *col.* 1:

Watson, John. Preface to "Watson's way with phonography." A new and improved method of teaching the art. The reporting style taught direct. * * Catonsville, Md., July 1st, 1884. 2 pp.

—— Watson's phonographic instructor. A new and important departure in the teaching of shorthand. Catonsville, Md. 1884. MS.

[To be published at an early date.]

Substitute, p. 153, *col.* 2:

Webster, Joseph. A system of stenography, on a new principle; in six letters, addressed to a friend; with questions and exercises, designed for the use of schools, as well as private students. By Joseph Webster, schoolmaster, Ossett; teacher of English, geography, mensuration, surveying, book-keeping, &c. London: Longman, Rees, Orme, Brown, Green & Longman. 1836. [Col.

Webster, Joseph—Continued. ophon: Wakefield: Richard Nichols, typographer, Market-place.] 48 pp. & 5 plates.

Insert, p. 153, *col.* 2:

Wells, John. A new and complete system of shorthand; being the second edition of Facilis, celera, certa, wherein the principles laid down by the most esteemed writers in the art, are rendered more simple, easy, and certain. By John Wells. London: W. Strange, Paternoster row; G. Berger, Holywell street, Strand; G. Purkess, Compton street, Soho; and sold by all booksellers. 1834. 17 pp. and 9 plates.

Substitute, p. 153, *col.* 2:

West, John. A system of short hand with plain and easy directions for writing it by John West. Multum in parvo. Edinburgh. Sold by W. Creech, C. Elliot and other book-sellers in town & country. Price 2s. 6d. [1784.] 4 eng. pp. printed on but one side of the paper.

—— Rules and observations concerning the short hand writing: of which the principles are exhibited in the preceding plates, by John West, assistant teacher of mathematics in the University of St Andrews. Edinburgh: printed for the author, by Mundell and Wilson, Back-stairs. 1784. 16 pp.

P. 154, *col.* 1:

Weston, James. Stenography compleated, &c.

Add: Price one guinea and a half; on royal paper, two guineas.

Substitute, p. 154, *col.* 2:

Weston, James. The book of common prayer in short-hand, according to Mr. Weston's excellent method, authoriz'd by his majesty, and universally approv'd of. For the use of the learners of his art. London: printed for the author, at the Hand & Pen over against Norfolk-street in ye Strand; where may also be had, books for teaching his art. 1730. Portrait, 6 & 290 eng. pp. 2¼ x 4½ inches: common prayer, 164 pp.; psalms, 126 pp.

Insert, p. 155, *col.* 1:

White, J. S. First reader in White's phonography. Spelling, reading and writing all languages with one alphabet. By J. S. White, Ph. D., manager of 84 schools containing 6340 pupils. Budd Henry's print, 1884. (New York.) 72 lith. & 29 letterpress pp.

Insert, p. 156, *col.* 1:

Williams, James. Reporter's staff. Llangollen: the author. 1879. 16 lith. pp. 6d.

—— The shorthand companion according to the alethographic method, including progressive exercises and examples illustrating the principle rules copious extracts of shorthand reading matter in the learners' and advanced styles; comparisons with modern systems embracing also alphabetical lists of the best outlines for common words, reporting contractions, and word-signs; the alphabet being founded on the application of the easiest written sign to the most frequent occuring sound. By Rev. James Williams Llangollen, North Wales. 1882. Copyright reserved. Price one shilling. The book may be had from Rev. James Williams, Ashfield terrace, Llangollen, North Wales; Mr. Geo. Harris, shorthand institute, Gloucester. 32 pp.

Substitute, p. 157, *col.* 2:

Wood, T. Cadivor. Llawlyfr Sainysgrif sef hyfforddwr ymarferol at ddysgu llawfer gymraeg a saesonaeg. Gan. T. Cadivor Wood. W. F. & M. Healey, city printing office, Princess street, Chester. August, 1863. 60 printed and lith. pages. 2s. 6d.

CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 3—1884.

ILLITERACY IN THE UNITED STATES IN 1870 AND 1880, WITH DIAGRAMS AND OBSERVATIONS; BY CHARLES WARREN, M. D.

WITH AN APPENDIX ON

NATIONAL AID TO EDUCATION; BY J. L. M. CURRY, LL. D., GENERAL AGENT OF THE PEABODY EDUCATION FUND.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

10800—C I 3

CONTENTS.

APPENDIX.

LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., February 4, 1884.

SIR: The material accompanying this letter may be described briefly as a comparison of statistics derived from the Ninth and Tenth Federal Censuses relative to the composition, distribution, and education of the people inhabiting this country in 1870 and 1880. As long ago as 1871 a preliminary study of the statistics in the census of 1870, which attracted much attention both at home and abroad, was published in my second annual report; a further consideration and revision of some parts of that material with many additions appeared in my report for 1872; and some valuable material from the census of 1880 was published in my report of 1881.

Comparison being one of the chief uses of statistics, I requested Dr. Charles Warren, statistician of this Office, to revise and complete the statistics already mentioned, to review the whole subject afresh, to express concisely and judiciously the main deductions and conclusions to which the facts pointed, and, whenever helpful, to prepare statistical maps of simple construction for the easier elucidation of the matter. The result is the monograph now forwarded. It contains, for the States and organized Territories, numerous facts of interest and frequent opportunities for comparison with one another and at two different dates. Care has been taken not to repeat the conclusions already reached and admirably expressed and illustrated in the publications of the Census Office, but to confine this effort to the production of a pamphlet that in moderate compass should contain facts useful especially to the school officers and educators of the country. I therefore transmit it with the recommendation that it be published as a circular of information.

I am, sir, very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. the SECRETARY OF THE INTERIOR.

Publication approved.

H. M. TELLER,
Secretary.

ILLITERACY IN THE UNITED STATES IN 1870 AND 1880.

PRELIMINARY REMARKS.

Several years ago, Dr. Edwin Leigh, of Missouri, the well known phonologist and educator, prepared a comparison of the statistics of illiteracy as shown in the censuses of 1840, 1850, and 1860, entitled "Illiteracy in the United States," which was published in 1868 as an appendix to the Special Report of the Commissioner of Education on the Condition and Improvement of Public Schools in the District of Columbia, and reprinted in the Report of the Commissioner of Education for 1870. The meagre and often unsatisfactory statistics of those censuses were coördinated and considered with consummate ability in that paper, and were illustrated by map diagrams of peculiar construction, invented by Dr. Leigh and called by him "bird's-eye views." Though the article and the "views" undoubtedly suggested the present study of the Ninth and Tenth Censuses and the map diagrams with which it is illustrated, yet all imitation of Dr. Leigh's methods has been avoided, not only because they are in some respects protected by copyright, but also because they are strongly imbued with their author's personal peculiarities. Imitation in such cases might be another name for failure.

No attempt, either, has been made to do a second time the work respecting the three censuses mentioned, because the work of Dr. Leigh is quite accurate and satisfactory and also because the statistics of those periods do not correspond exactly with those of later enumerations. The present attempt, therefore, deals only with the statistics of 1870 and 1880. Parts of the study devoted to this subject have appeared in the annual reports of the Commissioner of Education, but no consideration of it as a whole has yet been published. The Bureau of Education has been much favored and assisted by the Census Office and by its Superintendents, General Francis A. Walker and Colonel Charles W. Seaton, at various times, and this general acknowledgment is particularly due in connection with the present monograph.

Columns in the statistical tables having an asterisk (*) at the head have been calculated in the Bureau of Education, and should any errors be found that Office is responsible for them.

THE GENERAL POPULATION AT THE TWO PERIODS COMPARED.

Tables 1 and 2 are intended for comparison; they are illustrated by Diagrams 1–8 inclusive. The difference between the areas given in

the tables is owing to the greater accuracy of current geographical knowledge in 1880 and to an improved mode of computation. The list of States is augmented and that of the Territories is diminished in Table 2 by the transfer of Colorado (admitted as a State in 1876) to the first from the second division.

The area of the Union, excluding Alaska and the Indian Territory, was estimated by the census authorities to be 2,900,170 square miles; the area of Alaska is about 531,409 square miles and that of the Indian Territory is 69,830 square miles, or an aggregate for the whole country of 3,501,409 square miles. In size and in population we are the fourth nation of the world. Probably more than half the English speaking people of the earth live in the United States. The population increased 11,597,412 in the interval of ten years. In spite of the transfer of Colorado above mentioned, the population in the organized Territories and the District of Columbia, all exclusively subject to the power of Congress, increased 341,713.

The native females in 1870 exceeded the native males 17,898; in 1880 the native males exceeded the native females 300,668; in 1870 the excess of foreign-born males over foreign-born females was 446,657, and in 1880 it was 581,189. The excess of all males over all females in 1870 was 428,759; in 1880 it was 881,857.

Diagrams 1 and 2, 3 and 4, 5 and 6, 7 and 8 are constructed for direct comparison between the two periods. Native females in 1870 exceeded native males in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Maryland, the District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Tennessee, Alabama, Mississippi, and Louisiana. This excess had substantially disappeared in 1880 from the States of Vermont, Ohio, and Mississippi; it had diminished in Louisiana, Maryland, Alabama, Maine, New Hampshire, Pennsylvania, South Carolina, Tennessee, Virginia, Georgia, and North Carolina, and had increased in Connecticut, Massachusetts, New York, New Jersey, and the District of Columbia. An excess of native males over native females in 1870 was shown in all the States and Territories west of the Mississippi River as well as in Wisconsin, Michigan, Indiana, Illinois, Kentucky, and West Virginia. In 1880 all these States and Territories and, in addition, Ohio, Delaware, and Florida had an excess of native males; this excess was somewhat reduced in the States of California, Nevada, and Illinois; but it was greatly augmented in Texas, Colorado, Kansas, Nebraska, Michigan, Minnesota, Arkansas, Missouri, and Dakota.

Foreign-born males in 1870 exceeded foreign-born females in every division of the country except Massachusetts, New York, and Rhode Island, where the foreign-born females preponderated, and Utah, New Hampshire, Delaware, and the District of Columbia, where the foreign-born of the two sexes were substantially equal in numbers. In 1880 the foreign-born females exceeded the other sex in the three States

already named and also in New Hampshire and Connecticut. Delaware and the District of Columbia remained in their former condition of equilibrium, and the foreign-born males and females of Maine were substantially equalized by a decrease of the male element. On the other hand, Utah showed an excess of foreign-born males, and twenty-three other States and Territories exhibited a like increase, the most noticeable being Colorado, California, Michigan, Iowa, Minnesota, Texas, Illinois, Dakota, and Oregon. The foreign-born population as a whole is discussed later in this article in connection with Tables 7 and 8.

Tables 3 and 4 also illustrate each other. The white population of 1870 numbered 33,589,377; that of 1880 was 43,402,970, an increase of 9,813,593: 5,101,812 white males and 4,711,781 white females. The increase in the colored population was 859,852 males and 840,932 females, or 1,700,784 in all. The Chinese element of the population increased 42,140 as to males and 219 as to females; the number of Indians paying taxes was augmented by 40,676.

Diagrams 9 and 11 show the excess in thousands of white males and females in 1870; Diagrams 10 and 12 exhibit the same for 1880. Fifteen States and the District of Columbia at both periods had an excess of white females; this excess remained substantially stationary in Maine; it increased in the District of Columbia, Rhode Island, Virginia, Connecticut, New Jersey, Pennsylvania, New York, and Massachusetts; it decreased in New Hampshire, Maryland, South Carolina, Tennessee, Alabama, Georgia, and North Carolina. The excess of white males in 1870 remained substantially the same ten years later in Illinois and Vermont; it was increased in twenty-five States and Territories, viz: Delaware, Florida, Wyoming, Utah, Idaho, Kentucky, West Virginia, New Mexico, Montana, Indiana, California, Washington, Wisconsin, Arizona, Oregon, Missouri, Iowa, Ohio, Dakota, Minnesota, Nebraska, Michigan, Kansas, Colorado, and Texas; the white male excess was decreased during the same decade in Mississippi, Louisiana, Nevada, and Arkansas.

Diagram 13 shows that, in 1870, colored males exceeded colored females slightly in California, Arkansas, Illinois, Indiana, Ohio, and Michigan; this excess, as shown in Diagram No. 14, continued in 1880, except in Michigan, and extended to Arkansas and West Virginia. The colored females in both decades were in excess in Missouri, Louisiana, Mississippi, Alabama, Georgia, South Carolina, Tennessee, North Carolina, Kentucky, Virginia, Maryland, the District of Columbia, New Jersey, Pennsylvania, and New York; the colored female excess of 1870 in Texas was obliterated in 1880. Diagrams 15 and 16 show that the changes during the decade were small in all the States mentioned.

Chinese females in 1870 numbered 4,574, and in 1880 had increased to 4,793; the increase in the Chinese population was almost entirely male; Diagrams 17 and 18 show how this population had decreased in Nevada and Washington and how it had increased in New York,

Idaho, Wyoming, Colorado, Arizona, Oregon, and, particularly, California.

The Indians paying taxes more than doubled in number during the decade; in the Territories, their increase was nearly fivefold. Of course this latter increase has been largely due to the colonization and settlement of tribes previously nomadic or transported from the older States. The general increase in their number is, however, a useful indication of the amount and kind of civilizing influences exerted by the Federal Government on this interesting race. If the present policy be continued, the end of the present century will probably see the Indian population of the United States substantially civilized and converted into peaceable and self-supporting members of the communities in which they live.

The white males of the whole Union in 1880 exceeded the white females 858,830; much of this excess is occupied in subduing the dangers and difficulties of the Territories and the newer States. In such communities the expenditure of life is as inevitable as in the vicissitudes of war, and the brunt of it must be borne by the more adventurous and stronger sex. Several decades of years must pass before the disproportion of sex is annulled. If the relation between the two sexes in the colored population be assumed as the natural one for this continent, we find that about 1,340,000 white males are available, or growing up to become available, for this special conquest of natural difficulties in our more recent communities. Washington, Oregon, Idaho, Montana, California, Colorado, Arizona, Dakota, Nebraska, Kansas, Minnesota, Michigan, and Texas show where the pioneers now muster thickest.

The large number of white foreigners in the country north of the Missouri, Ohio, and Potomac Rivers is replaced in the southeastern part of the Union by negroes, mostly of native birth, and in the far western section by a strong Chinese element. The colored population in most of the States is divided between the sexes in normal proportions. The serious disproportion of males to females among the Chinese in 1870 became so much greater in 1880 that Chinese males exceeded Chinese females in number 96,000, thus proving that their stay in the country is only provisional and temporary, and that they have given no "hostages to fortune." The conditions of their stay and of the further admission of Chinese men in such disproportion are proper subjects for national legislation; the present condition of Chinese immigration is demoralizing to those who come here, destructive of previous economic relations, and profitable mainly to the few great "companies" who control and employ labor purely for their own benefit, regardless of the misery they entail on others.

Tables 5 and 6 exhibit the distribution of the native population in 1870 and 1880. The native population as a whole increased 10,484,698 during the decade, and those living in the States and Territories of their birth increased 8,561,394. About 77 per cent. of the natives in 1870 lived in the States and Territories where they were born; in 1880 this per-

centage was reduced to 67. The third and fourth columns in these tables show respectively the gross contribution of all other parts of the Union to the native population of each State and Territory, and the aggregate contribution of natives by each State and Territory to the rest of the Union; the last two columns show, for each State and Territory, the excess of this native immigration or emigration at the two periods.[1] Diagrams 19, 20, 21, and 22 illustrate these two tables. The great increase of native migration to Dakota, Nebraska, Kansas, Colorado, and Texas is particularly observable.

Tables 7 and 8, with Diagrams 23, 24, 25, and 26, exhibit the number and origin of the principal foreign elements of the population in 1870 and 1880. During the decade the increase of foreign-born inhabitants of the Union was 1,112,714. Immigrants from Ireland seemed to have decreased in number 1,256 during the decade. Of the net increase, immigrants from the German Empire were 276,209; from England, Wales, and Scotland, 151,306; from British America, 223,693; from Sweden, Norway, and Denmark, 198,577; and from China, Mexico, the West Indies, and other unnamed foreign countries, 264,185.

Diagrams 23, 24, 25, and 26 exhibit some of the salient facts at the two periods. Florida showed that her chief foreign-born population was of West Indian birth; Minnesota and Dakota, both in 1870 and 1880, were strongly Scandinavian; Mexicans were most numerous in 1870 among the foreign-born residents of Arizona and New Mexico; in 1880 they outnumbered any other foreign-born element in Texas. Oregon, Idaho, and Montana had more Chinese than any other class of foreigners in 1870; ten years after they were outnumbered in Montana, but had become the largest foreign-born element in Washington, Nevada, and California. A reference to Diagrams 17 and 18 will show that an influx of 30,000 Chinese males to these three communities was enough to produce this result. In 1870 British Americans were the most numerous foreign-born residents in Michigan, Maine, New Hampshire, and Vermont; in 1880 they outnumbered foreigners from any other country in Montana as well. Natives of Great Britain, in 1870, were the most numerous immigrants from abroad to North Carolina, Utah, Colorado, and Washington; during the decade they were outnumbered by the Chinese in the last named Territory, but had gained a numerical superiority to the Irish in Wyoming. Immigrants from the German Empire exceeded other classes of foreigners in 1870 in Ohio, Kentucky, Indiana, Illinois, Wisconsin, Iowa, Nebraska, Kansas, Missouri, Arkansas, Louisiana, Texas, South Carolina, and Maryland; ten years

[1] The statements of Table VI, Vol. I, Census of 1870 (pages 328–335) have been followed in constructing the sixth table, on p. 45. Table XI of the Compendium of the Ninth Census is erroneous in several places: e. g., on page 381, in the column headed "Tennessee," the 32d line has "261,347." The fuller returns of the quarto edition above cited report (page 333), under "Tennessee," 32d line, 766,997 white, 260,630 colored, and 26 Indian natives. These numbers equal the 1,027,653 given in the corresponding part of Table 6 in this publication.

later they were fewer than Mexicans in Texas, but were more numerous than the Irish in Alabama, Virginia, and West Virginia. During the decade natives of Ireland were outnumbered in California, Nevada, Wyoming, Alabama, Virginia, and West Virginia; but they were, in 1880, more numerous than any other foreign element in New York, Pennsylvania, Massachusetts, New Jersey, Connecticut, Rhode Island, Tennessee, Delaware, Georgia, Mississippi, and the District of Columbia. Stated in more general terms, the facts show that, in 1870, Irish foreigners predominated in seventeen States and Territories, Spanish foreigners in three, Canadian French in three, other British Americans in one, English, Scotch and Welsh in four, Swedes, Norwegians, and Danes in two, and Germans in fourteen; and that in 1880 the Canadian French, the Scandinavians, and the native British held their ground, while the Spanish outnumbered other foreigners in one more State, the Anglo-Saxons from British America in one more Territory, the Chinese in two States, and the Germans in two, the Irish being outnumbered in six. The preponderance of Celtic methods and ideas in our immigrant population is checked, at least for the present; the German, Scandinavian, and British elements will exert an ever-increasing Teutonic influence, and will form a strong, sensible, and steady body to counterbalance the volatile and brilliant qualities of the Irish blood. The approaching railroad connections with Mexico will doubtless encourage an exchange of population with the country along our southwestern border. Whether this will be advantageous or not cannot be foretold at the present time. Certainly, the sluggishness shown by the native and immigrant population of New Mexico in becoming American in feeling or action is not encouraging for the future of the lands that they and their congeners across the border have occupied.

The increase of foreign-born residents in some States during the decade was very great; it was about 33,000 in Colorado and New Jersey, 41,000 in Wisconsin, 43,000 in Pennsylvania, 47,000 in Dakota, 53,000 in Texas, 57,000 in Iowa, 62,000 in Kansas, 66,000 in Nebraska, 68,000 in Illinois, 73,000 in New York, 83,000 in California, 90,000 in Massachusetts, 107,000 in Minnesota, and 120,000 in Michigan. On the other hand, there was a decrease of foreigners in Vermont, Missouri, Maryland, Kentucky, Tennessee, South Carolina, Georgia, Alabama, Mississippi, and Louisiana.

This survey of the general population, without reference to age, has been prepared in the hope that it will be useful in the consideration of the remarks hereafter presented; of special importance are the items respecting the increase of native males, of all males, of Chinese males on the Pacific coast, of the native migration between States, and of the Pan-Teutonic element in the foreign-born residents.

THE MINOR POPULATION OF THE TWO PERIODS COMPARED.

Tables 9 and 11 contain statistics of the population under 21 years of age in 1870. Table 10 shows, for 1880, the age, by single years, of

the minor population in each State and Territory and in the whole Union. General Walker and Colonel Seaton, for the first time in our statistical history, have wisely reported in this way the age of the population under 80 years of age. Educators will see at a glance how important it is for their calculations and how useful in their labors. In order that a more perfect comparison between the ages for 1870 and 1880 may be instituted whenever desirable, Table 12 for 1880 has been constructed like Table 11 for 1870. The five columns of Table 9 may be compared with the five upper lines of Table 10.

The American theory and general belief that the minor population of a state is a precious responsibility resting on the adult portion of the community, doubtless will attract special attention to Table 13 and Diagrams 27 and 28, which exhibit a comparison of the minor and adult populations of 1870 and 1880. If other conditions are substantially equal, it is obvious that the proportion of minors to adults in a population may seriously affect the educational opportunities of the younger class and the educating ability of the older portion. Thus, in 1870, California had about 416 minors to 584 adults in its population, while Arkansas had 585 minors to 415 adults; in 1880 there were 303 minors to 697 adults in Arizona and 579 minors to 421 adults in Mississippi. Even if California and Arkansas in 1870 or Arizona and Mississippi in 1880 had possessed equal taxable property per capita of their adult population, the burden on the adults of Arkansas and Mississippi at those periods would have been much heavier than the burden on the adults of California and Arizona. Compare Vermont and Mississippi in 1880: the one had 422 minors to 578 adults; the other, as already mentioned, 579 minors to 421 adults—almost exactly opposite conditions. If the wealth of every adult in both States be assumed to be equal, the financial ability to educate the minors of the two States would be for the Vermonter $\frac{578}{422}$ or 1.349, and for the Missisippian, $\frac{421}{579}$ or .730. Again, compare the condition of any State at the two periods, e. g., Delaware: in 1870 it had 516 minors to 484 adults; in 1880, it had 484 minors to 516 adults; the wealth per capita of adult population remaining the same, the ability of the adult Delawarean to bear the burden of supporting and educating the minors of the State rose from $\frac{484}{516}$ to $\frac{516}{484}$, or from .938 to 1.066.

The relation of these facts to the proposed "national aid to education" is apparent at a glance. When a measure with this object was first framed thirteen years ago by the Hon. George F. Hoar, a Representative from the State of Massachusetts, the condition of affairs in most of the "Southern" or "late slave" States was pitiable in some respects and alarming in others: in 1870 the number of adults in 1,000 inhabitants of Arkansas was 415; Texas, 421; Florida, 424; Georgia, 425; Mississippi, 426; Alabama, 428; Tennessee, 431; West Virginia, 432; Kentucky, 436; North Carolina, 441; Missouri, 442; South Carolina, 442; Virginia, 463; and Louisiana, 474. At the same date the number of adults in 1,000 inhabitants of Indiana was 447; Iowa, 449;

Wisconsin, 455; Minnesota, 460; Illinois, 461; Ohio, 478; Kansas, 481; Maryland, 484; Delaware, 484; Pennsylvania, 492; Michigan, 497; Nebraska, 505; New Jersey, 529; New York, 538; Maine, 549; Vermont, 554; Rhode Island, 572; Connecticut, 573; Massachusetts, 576; and New Hampshire, 597. The Southern States had not recovered from the effects of the war and the abolition of slavery. The friends of education labored energetically during the decade to support free schools, but they were laboring under great disadvantages, one of which Table 13 displays. Nor was the condition of their population greatly changed in 1880; the proportion of adults in Arkansas, Florida, Georgia, Kentucky, Missouri, Tennessee, Texas, and West Virginia had increased somewhat, but it was practically the same in Alabama and North Carolina, and it was diminished in Virginia, South Carolina, Mississippi, and Louisiana. The development of industries and the sobering effect of necessity have produced a healthful change in the condition of these States; but it will be some time before either whites or negroes will be able to spare largely for free public schools out of the proceeds of their labor.

Another and still darker thought is suggested by the extremely opposite condition of the Northeastern States. Tables 5 and 6 accompanying this article show how many native inhabitants each of these States contributed to the enumerated populations of the rest of the Union. The greater part of this contribution, by the natural condition of things, must have been composed of young adults. Those adults remaining at home must consist largely of foreign-born adults and the richer, older, and less energetic part of the native adults; in fact a comparison of Tables 5 and 6 with Tables 7 and 8 will show that the migration of natives has made room for the influx of foreigners. The leisurely, elderly, and timid adults of a community do not propagate children in such numbers or of such vital stamina as the physiologist and the statesman contemplate with most satisfaction. The danger approaching the native stock of New England and New York is extinction, just as that advancing on the native stock of the South is helpless overproduction, an increase untutored, uneducated, and unprepared to bear its proportion of the burdens of society. Some other aspects of the "adult and minor" problem will be presented in a later part of this paper.

THE LEGAL SCHOOL POPULATION IN 1880.

Having ascertained the number of persons under 21 years of age, it now becomes proper to show, for 1880, how many of them, under the public school laws of the several States and Territories, were of "legal school age." The Superintendent of the Census, for special reasons, has reported as the population of school age all between the ages of 5 and 17 (both years included); but this does not conform to the ages prescribed by the greater number of the States and Territories, nor, in the opinion of the most judicious school officials, is it the period best adapted for

public school work. I have, therefore, computed the number for each State and Territory according to its school law in 1880, and have inserted in Table 14 these numbers, as well as those representing the population between 6 and 15 years old (both years included). Table 14, then, compares the number of minors under, of, and over the legal school age with the numbers under 6 years old, between 6 and 15, and over 16.

The difference between the population of legal school age and that from 6 to 15 years old is also given, not as an indication of the number that could be profitably excluded from public school privileges, but as showing how many are afforded opportunities under American school laws, who, in many countries, are considered entirely beyond the period for the assistance of the state. The pioneer character of many American communities, and the great immigration of young foreigners, who, before becoming citizens should be assimilated to American thoughts and habits, are excellent reasons for this liberal feature of our school laws.

Pursuing the inspection of the legal school population of 1880, now ascertained, I present Tables 15, 16, and 17, which exhibit, respectively, the male, the female, and the total school population considered as native white, foreign white, total white, colored (including Indians and Chinese), and total of all races.

Tables 15 and 16 show that the sixteen "Southern" States and the District of Columbia, in 1880, contained, in their school population, 1,032,101 colored males to 2,046,656 white males, and 1,039,385 colored females to 1,998,869 white females. Unless a miraculous change should occur in the moral and ethnic relations of the South, coeducation of the races is highly improbable; and attempts at such coeducation are at present premature, and therefore destined to overthrow.

The seventeenth table and the twenty-ninth and thirtieth diagrams exhibit the deviations from the normal native white ideal. The success of public schools in the Northern States will never be seriously affected by any question of race admixture or intercourse. In these States the attack comes from the foreign element of the population, or rather from that portion of the foreign element that brings with it foreign ideals of religion and culture. It is true that some native dilettanti sneer at the "common school," chiefly because it is uncommon to do so; and their sole excuse for living would disappear if they could not abuse their own country's most wonderful invention. But most of the abuse comes from persons of foreign birth and unassimilated ideas. In most cases the homely common sense of American life eradicates this noxious nonsense, particularly when the objectors begin to have children of their own.

Experience has proved that cowardice in dealing with this subject is fatal. There should be no faltering and no parley with the opponents of the public schools in America. Let the issue be made fairly on the question, and it will be found that Americans will not tolerate the domination of influences hostile to free institutions, either on ecclesiastical or aristocratic grounds.

THE ILLITERATE POPULATION AT THE TWO PERIODS COMPARED.

Having studied the minor population, and that part of it known as the "school population," or "population of legal school age," it is now time to consider what part of the population has escaped or been deprived of the means of mental training. The census of 1870 divided the illiterate into those "unable to read," native and foreign, 10 years old or more, and those "unable to write," according to race and sex, from 10 to 14, 15 to 20, and 21 or more years of age. The superintendent of the last census, seeing that the chief foreign element in the illiterate population is of the white race, modified the form of tabulated illiteracy, giving the "number unable to read" and the "number unable to write," not only dividing the latter by age and sex, as before, but also as "white," native and foreign, and "colored," including under the latter term the illiterate Chinese and Indians, as well as the negroes. Another improvement of this census was that each division of illiterates was compared with the corresponding class of the general population, and the percentage of such illiteracy was also calculated and reported. Part of a somewhat similar comparison between the illiterates and general population of 1870 was published in the Report of the Commissioner of Education for 1872. The tables accompanying this paper contain a complete comparison of the illiteracy of 1870 with that of 1880, wherein the calculations required to make the items of the first period conform to those of the second have been made in the Bureau of Education. Only in one respect has no comparison been attempted—that of the nativity of illiterates at the two periods—and this for the reason already given. The nativity of white illiterates in 1880, therefore, is reported without any corresponding table from the census of 1870.

Readers should bear in mind that "colored" in the tables and diagrams now to be considered, as in some of those already examined, means "Chinese and Indian" more than "negro" in California, Oregon, Washington, Nevada, Arizona, Montana, and Utah; also that it means "Chinese" more than "negro" in Idaho and Wyoming, "Indian" rather than "negro" in Dakota and New Mexico, and "Indian and negro" in Michigan, Minnesota, and Wisconsin.

A geographical instead of alphabetical arrangement of the States and Territories has been adopted, similar to that used in the Report of the Commissioner of Education for 1871, pp. 61 et seq.

Tables 18 and 19 show for each State and Territory, as well as for each division or group and the entire Union, the number of persons 10 years old and upward, the number and percentage of such persons returned as unable to read, and the number and percentage returned as unable to write in 1870 and 1880. During the decade the percentage of illiteracy (i. e., the inability to write) diminished more than 5 per cent. in the Southern States; in Florida more than 11 per cent., the District

of Columbia, Virginia, and Texas more than 9 per cent., Delaware more than 7 per cent., West Virginia and Georgia more than 6 per cent., Kentucky nearly 6 per cent., Missouri nearly 5 per cent., Mississippi and Maryland more than 4 per cent., Louisiana, Alabama, and North Carolina more than 3 per cent., South Carolina and Tennessee more than 2 per cent., and Arkansas 1 per cent. The extraordinary improvement in Florida is doubtless due much to the large immigration of intelligent adults attracted by the orange culture and the genial climate; but why should Arkansas, which has been populated so rapidly from its wise exhibition of its wonderful natural resources at the Centennial Exhibition, be so little improved?

The northern group shows a smaller improvement, there being much less illiteracy to deal with. Kansas, Ohio, and Indiana decreased their illiterates more than 3 per cent., Massachusetts, Michigan, Nebraska, New Jersey, and Minnesota nearly 2 per cent., New York, Pennsylvania, Rhode Island, Connecticut, Iowa, and Wisconsin more than 1 per cent., Illinois 1 per cent., and Vermont less than 1 per cent. Maine and New Hampshire showed increased ratios of ignorance.

The Pacific division shows a great improvement as a whole, Idaho leading with more than 18 per cent.; Colorado had diminished its illiteracy nearly 16 per cent., Arizona more than 14 per cent., New Mexico more than 13 per cent., Dakota nearly 10 per cent., Wyoming more than 4 per cent., Utah nearly 4 per cent., Oregon 1 per cent., and Washington a half of 1 per cent.; while on the other hand the ratio of ignorance in California and Montana was somewhat greater, and that in Nevada nearly 6 per cent. more in 1880 than it was in 1870.

The *ratio* of illiterates to population 10 years old and upwards for the northern division was 59 to 1,000; for the Pacific division, 100 to 1,000; for the southern division, 366 to 1,000; and for the country as a whole, 170 to 1,000. These ratios are improvements over those of ten years before, when the ratio for the whole country was 200 to 1,000. But the absolute *numbers* of illiterates in 1880 were greater than in 1870, except in the northern group:

Census year.	Northern division.	Southern division.	Pacific division.	The States and Territories.
1870	1,354,220	4,189,972	113,952	5,658,144
1880	1,338,814	4,741,173	159,971	6,239,958
Increase	— 15,406	551 201	46,019	581,814

This shows that the States in the northern division not only grappled successfully with the illiteracy of the previous decade, but with the illiterates among the very large population that poured into the country and, as shown by previous tables, settled in this part of it. The union of school and state in the southern division, as yet imperfectly supported, did not prevent the increase in the *absolute* number of illiterates,

but did succeed, as has been shown, in reducing the *proportion* of it to the whole population of the same age. The same is true of the Pacific division. An equitable and persevering pursuance of the same policy for another decade, under better conditions, will, it is hoped, show a more favorable result in 1890.

The statistics respecting the native white illiterates of 1880 presented in Table 20 confirm this hope to some extent. The local school activity in the Southern States during the decade was devoted chiefly to the maintenance of schools for whites. There being few foreigners in the Southern States at either enumeration under review, we can ascertain nearly the improved condition of the whites in the southern group by comparing the percentage of native white illiteracy in Table 20 with that of white illiteracy in Table 22. The white foreigners in the southern group were, as a class, much less illiterate than the native whites, as Table 20 shows, but their small number in this part of the country makes little difference in the great cloud of ignorance that darkens every prospect in those States. The foreign-born whites in the northern group constitute about one-fourth of the white population of those ages, and the proportion of illiterate foreigners is much greater, there being 123 to the 1,000, while there are only 34 illiterates to the 1,000 among the white natives. There are nearly 74,000 more foreign-born than native illiterates in the northern group. The foreigners in the Pacific division formed in 1880 one-third of the white population 10 years old and over.

Tables 21 and 22 exhibit the illiteracy of race in 1870 and 1880. The latter date showed 220,000 more colored than white illiterates, although the white population of the same age outnumbered the others more than twenty-seven and a half millions. Surely this is dangerous to the colored people themselves, to the communities in which they are resident citizens, property owners, and voters, and to the nation of which they form a part. Only one in four of the colored persons 10 years old and over in the southern division could write. The colored illiterates in this part of the Union, in spite of all that has been done by local, religious, State, and voluntary effort, increased 365,041 in the decade. Surely this colored illiteracy is a weak spot in our national life. Whatever may have been the legal position or political importance of the black population before the war of 1861–1865, it is now a part of our body politic, and its ignorance is a tremendous danger. The nation that gave the negro his freedom loads the southern white with nearly the entire expense and responsibility of his training in civic life and duty. The property of the Southern States is and has been owned chiefly by the white race; the colored race was part of that property. When the white man is deprived of his property in the negro may he not naturally expect that the nation should help in the transformation of the negro chattel into the negro citizen? Should not the nation help to educate the surplus of ignorant child life in the South

which is growing up into manhood and womanhood without any sufficient knowledge in letters, industry, morals, law, and citizenship?

The whites of some Southern States, as before remarked, have devoted more of their efforts to the education of white children than to that of colored children; yet the number of white illiterates in the South was greater by 186,000 in 1880 than in 1870. Table 17 has shown that the legal school population of the southern group was about two-thirds white to one-third colored—2,000,000 whites to 1,000,000 colored; then the increase of white illiterates to the million of white school population was 93,000, and of colored illiterates to the million of colored school population 365,000, or nearly four times as great.

The decrease of white illiteracy in the Northern and Pacific groups is gratifying, but the augmented illiteracy of other races (chiefly Chinese and Indian) in the Pacific group shows that here also the presence of alien races either burdens the purses of the States and Territories or is being neglected in such a way as to create dangerous amounts of ignorance in the future.

Tables 23 and 24 exhibit the total male and female illiteracy of the whites 10 to 14 years old (both ages inclusive) in 1870 and 1880, respectively. A white child 10 years old who cannot write his name is by some people supposed to be a rarity in this country; but such children numbered more than half a million in 1870 and nearly six hundred thousand in 1880. The education of this part of the community is so obviously useful and necessary that even the morosest of bigots and the sourest of pessimists do not venture to object to it audibly; yet thirteen white children out of a hundred, in the year 1880, escaped the combined influences of church, day school, Sunday school, and family teaching. As might be expected in a country wherein the education of girls is a subject of great solicitude, the proportion of ignorance among the female children was less than that of male children at both periods of enumeration.

Tables 25 and 26 present, in similar form, the white illiterates 15 to 20 years old (both ages inclusive) for 1870 and 1880. Here the ignorance of the white *youths* is shown, as in the two preceding tables that of white *children*. These white youths were in many instances beyond all chance of instruction. Those reported in Table 25 (1870) f rmed a considerable share of the adult white illiterates of Table 28 (1880). The surviving males of Table 25 formed part of the voting population in the national elections of 1876 and 1880. Many of those included in Table 26 will throng around the polls at the national elections of 1884 and 1888. Fortunately, the strenuous application of all existing instrumentalities for education has prevented any great increase in the number of these illiterates in eighteen of the States: Maine, New Hampshire, Massachusetts, Rhode Island, Pennsylvania, Michigan, Illinois, Minnesota, Nebraska, Kansas, Tennessee, Arkansas, Louisiana, Texas, California, Oregon, Nevada, and Colorado. The same exertions decreased this male

illiteracy in the other seventeen States, in Utah and New Mexico, and thereby in each of the three groups of the table and in the Union as a whole. There were nearly 6,000 more white illiterate male youths in 1870 than in 1880. The total number of white male youth had increased during the decade 532,529.

Tables 27 and 28 exhibit the adult white illiteracy of 1870 and 1880, and its ratio to the adult white population of those periods.[1] The better education of the female sex shown in the last four tables disappears in these. The white women of both enumerations were more illiterate than the white men. There was a manifest improvement in this respect, however, during the decade, particularly in the northern group, where illiterate white men increased 38,108, while the illiterate white women decreased 34,645. In the southern group the illiterate white men increased 93,405, and the illiterate white women 51,727. In the western group the increase of ignorant white men was 6,176, and that of ignorant white women 7,004. Therefore, the net increase of adult ignorant white males during the decade for the whole country was 137,859, and that of adult ignorant white females was 24,086. The ignorance of the white adult population in New Mexico was positively scandalous at both enumerations.

The illiterate element of the other races in 1870 and 1880 is shown in Tables 29 and 30 for those between 10 and 14 years old, in Tables 31 and 32 for those between 15 and 20 years old, and in Tables 33 and 34 for those 21 or more years of age. The illiterates among the Chinese are practically the only foreign element exhibited in these tables for which the nation and the States are not responsible. The northern group had only 79 more colored illiterate children, actually 2,871 fewer colored illiterate youths, and only 17,465 more colored illiterate adults in 1880 than in 1870. The southern group showed a colored illiterate increase during the same time of 78,114 children, 4,467 youths, and 282,460 adults. The colored illiterate increase in the Pacific group during the decade consisted of 2,327 children, 5,137 youths, and 27,467 adults. The figures of the southern group would seem to show that many of those States made desperate efforts in the earlier part of the decade to include the colored children in their schemes of public instruction, and that the effort was relaxed or abandoned later, as being too great for their resources. Probably the panic of 1873–'74 and the financial depression existing till 1878–'79 had much to do with this change. There is ample evidence, indeed, that the educators of the South have struggled with every sort of difficulty, and that they are not blamable for the increase of illiteracy, white or colored, in their States.

[1] The column of "Enumerated white males," &c., in Table 27, does not agree either with the column of "White male adults," on page 619, vol. 1, of the census of 1870, or with the same column on page 554 of the "Compendium" of that census, the statistics of which are erroneous in twenty-six out of forty-eight instances, and so provable from the tables of ages of the aggregate white population given in that census.

STATISTICAL TABLES AND MAP DIAGRAMS.

TABLE 1.—*The area and population of the States and Territories and the general nativity and sex of the population in 1870.*

States and Territories.	Estimated area in square miles.[a]	Population.	Population to square mile.	Nativity. Native. Male.	Nativity. Native. Female.	Nativity. Foreign. Male.	Nativity. Foreign. Female.
Alabama	50, 722	996, 992	19. 66	482, 470	504, 560	6, 268	3, 694
Arkansas	52, 198	484, 471	9. 30	244, 491	234, 954	3, 770	1, 256
California	188, 981	560, 247	2. 29	199, 421	150, 995	150, 058	59, 773
Connecticut	4, 750	537, 454	113. 15	207, 014	216, 801	58, 256	55, 383
Delaware	2, 120	125, 015	58. 97	57, 963	57, 916	4, 665	4, 471
Florida	59, 268	187, 748	3. 17	91, 573	91, 208	2, 075	1, 902
Georgia	58, 000	1, 184, 109	20. 42	572, 126	600, 856	6, 829	4, 298
Illinois	55, 410	2, 539, 891	45. 84	1, 033, 161	991, 532	283, 376	231, 822
Indiana	33, 809	1, 680, 637	49. 71	779, 009	760, 154	78, 985	62, 489
Iowa	55, 045	1, 194, 020	21. 69	510, 864	478, 464	115, 053	89, 639
Kansas	81, 318	364, 399	4. 48	171, 248	144, 759	30, 976	17, 416
Kentucky	37, 680	1, 321, 011	35. 33	631, 020	626, 593	34, 655	28, 743
Louisiana	41, 346	726, 915	17. 58	328, 743	336, 345	33, 422	28, 405
Maine	35, 000	626, 915	17. 91	287, 434	290, 609	25, 669	23, 212
Maryland	11, 124	780, 894	70. 20	342, 236	355, 246	42, 748	40, 664
Massachusetts	7, 800	1, 457, 351	186. 84	535, 852	568, 180	167, 927	185, 392
Michigan	56, 451	1, 184, 059	20. 97	469, 034	447, 015	148, 711	119, 299
Minnesota	83, 531	439, 706	5. 26	145, 190	133, 819	90, 109	70, 588
Mississippi	47, 156	827, 922	17. 56	405, 859	410, 872	7, 562	3, 629
Missouri	65, 350	1, 721, 295	26. 34	769, 457	729, 571	126, 890	95, 377
Nebraska	75, 995	122, 993	1. 62	51, 183	41, 062	19, 242	11, 506
Nevada	104, 125	42, 491	0. 41	16, 808	6, 882	15, 571	3, 230
New Hampshire	9, 280	318, 300	34. 30	140, 991	147, 698	14, 649	14, 962
New Jersey	8, 320	906, 096	108. 91	353, 485	363, 668	96, 187	92, 756
New York	47, 000	4, 382, 759	93. 25	1, 597, 192	1, 647, 214	566, 037	572, 316
North Carolina	50, 704	1, 071, 361	21. 13	516, 684	551, 648	2, 020	1, 009
Ohio	39, 964	2, 665, 260	66. 69	1, 138, 971	1, 153, 796	198, 579	173, 914
Oregon	95, 274	90, 923	0. 95	43, 952	35, 371	9, 179	2, 421
Pennsylvania	46, 000	3, 521, 951	76. 56	1, 468, 318	1, 508, 324	290, 181	255, 128
Rhode Island	1, 306	217, 353	166. 43	78, 656	83, 301	26, 100	29, 296
South Carolina	34, 000	705, 606	20. 75	349, 260	358, 272	4, 642	3, 432
Tennessee	45, 600	1, 258, 520	27. 60	611, 727	627, 477	11, 620	7, 696
Texas	274, 356	818, 579	2. 98	387, 588	368, 580	35, 969	26, 442
Vermont	10, 212	330, 551	32. 37	140, 520	142, 876	25, 201	21, 954
Virginia	38, 348	1, 225, 163	31. 95	589, 038	622, 371	8, 020	5, 734
West Virginia	23, 000	442, 014	19. 22	213, 624	211, 299	9, 219	7, 872
Wisconsin	53, 924	1, 054, 670	19. 56	349, 547	340, 624	195, 339	169, 160
Total	1, 984, 467	38, 115, 641	19. 21	16, 301, 709	16, 340, 903	2, 946, 659	2, 526, 370
Arizona	113, 916	9, 658	0. 08	2, 905	944	3, 982	1, 827
Colorado	104, 500	39, 864	0. 38	19, 910	13, 355	4, 910	1, 689
Dakota	150, 932	14, 181	0. 09	5, 562	3, 804	3, 316	1, 499
District of Columbia	64	131, 700	2, 057. 81	54, 159	61, 287	8, 033	8, 221
Idaho	86, 294	14, 999	0. 17	5, 054	2, 060	7, 130	755
Montana	143, 776	20, 595	0. 14	9, 562	3, 054	7, 209	770
New Mexico	121, 201	91, 874	0. 76	43, 505	42, 749	3, 630	1, 990
Utah	84, 476	86, 786	1. 03	28, 994	27, 090	15, 127	15, 575
Washington	69, 994	23, 955	0. 34	11, 004	7, 927	3, 986	1, 038
Wyoming	97, 883	9, 118	0. 09	4, 258	1, 347	2, 961	552
Total	973, 036	442, 730	0. 45	184, 913	163, 617	60, 284	33, 916
Grand total	[b] 2, 957, 503	38, 558, 371	13. 03	16, 486, 622	16, 504, 520	3, 006, 943	2, 560, 286

a The reason for the differences between these areas and those in Table II is given in the foregoing remarks.

b The area of Alaska was estimated in 1870 to be 577,390 square miles and that of the Indian Territory to be 68,991 square miles; they are not included in this total.

TABLE 2.—*The area and population of the States and Territories and the general nativity and sex of the population in 1880.*

States and Territories.	Area in square miles.	Population.	Population to square mile.	Nativity.			
				Native.		Foreign.	
				Male.	Female.	Male.	Female.
Alabama	51,540	1,262,505	24.50	616,673	636,098	5,956	3,778
Arkansas	53,045	802,525	15.13	408,939	383,236	7,340	3,010
California	155,980	864,694	5.54	309,650	262,170	208,526	84,348
Colorado	103,645	194,327	1.87	99,342	55,195	29,789	10,001
Connecticut	4,845	622,700	128.52	241,409	231,299	64,373	65,619
Delaware	1,960	146,608	74.80	69,264	67,876	4,844	4,624
Florida	54,240	269,493	4.97	130,855	128,739	5,559	4,320
Georgia	58,980	1,542,180	26.15	756,535	775,081	6,446	4,118
Illinois	56,000	3,077,871	54.96	1,267,793	1,226,502	318,730	264,846
Indiana	35,910	1,978,301	55.09	930,290	903,833	80,071	64,107
Iowa	55,475	1,624,615	29.29	701,502	661,463	146,634	115,016
Kansas	81,700	996,096	12.19	471,566	414,444	65,101	44,985
Kentucky	40,000	1,648,690	41.22	800,658	788,515	31,932	27,585
Louisiana	45,420	939,946	20.69	439,537	446,263	29,217	24,929
Maine	29,895	648,936	21.71	294,506	295,547	29,552	29,331
Maryland	9,860	934,943	94.82	419,841	432,296	42,346	40,460
Massachusetts	8,040	1,783,085	221.78	651,659	687,935	206,781	236,710
Michigan	57,430	1,636,937	28.50	642,932	605,497	219,423	169,085
Minnesota	79,205	780,773	9.86	267,645	245,452	151,504	116,172
Mississippi	46,340	1,131,597	24.42	560,994	561,394	6,183	3,026
Missouri	68,735	2,168,380	31.55	1,005,578	951,224	121,609	89,969
Nebraska	76,185	452,402	5.94	192,466	162,522	56,775	40,639
Nevada	109,740	62,266	0.57	21,891	14,722	20,128	5,525
New Hampshire	9,005	346,991	38.53	148,256	152,441	22,270	24,024
New Jersey	7,455	1,131,116	151.73	447,824	461,592	112,098	109,602
New York	47,620	5,082,871	106.74	1,906,721	1,964,771	598,601	612,778
North Carolina	48,580	1,399,750	28.81	685,509	710,499	2,399	1,343
Ohio	40,760	3,198,062	78.46	1,401,890	1,401,229	212,046	182,897
Oregon	94,560	174,768	1.85	79,229	65,036	24,152	6,351
Pennsylvania	44,985	4,282,891	95.21	1,829,000	1,866,062	307,655	280,174
Rhode Island	1,085	276,531	254.87	98,606	103,932	34,424	39,569
South Carolina	30,170	995,577	33.00	486,612	501,879	4,396	3,290
Tennessee	41,750	1,542,359	36.94	759,349	766,308	9,928	6,774
Texas	262,290	1,591,749	6.07	769,122	708,011	68,718	45,898
Vermont	9,135	332,286	36.38	145,445	145,882	21,442	19,517
Virginia	40,125	1,512,565	37.70	736,766	761,103	8,823	5,873
West Virginia	24,645	618,457	25.09	304,517	295,675	9,978	8,287
Wisconsin	54,450	1,315,497	24.16	460,054	450,018	220,015	185,410
Total	2,040,785	49,371,340	24.19	21,559,825	21,311,731	3,515,794	2,983,990
Arizona	112,920	40,440	0.36	16,026	7,765	11,576	4,473
Dakota	147,700	135,177	0.92	49,878	33,504	32,418	19,377
District of Columbia	60	177,624	2,960.40	74,845	85,657	8,733	8,389
Idaho	84,290	32,610	0.39	13,868	8,768	7,950	2,024
Montana	145,310	39,159	0.27	18,539	9,099	9,638	1,883
New Mexico	122,460	119,565	0.98	59,161	52,353	5,335	2,716
Utah	82,190	143,963	1.75	52,189	47,780	22,320	21,674
Washington	66,880	75,116	1.12	33,601	25,712	12,372	3,431
Wyoming	97,575	20,789	0.21	9,722	5,217	4,430	1,420
Total	859,385	784,443	0.91	328,429	275,855	114,772	65,387
Grand total	2,900,170	50,155,783	17.29	21,888,254	21,587,586	3,630,566	3,049,377

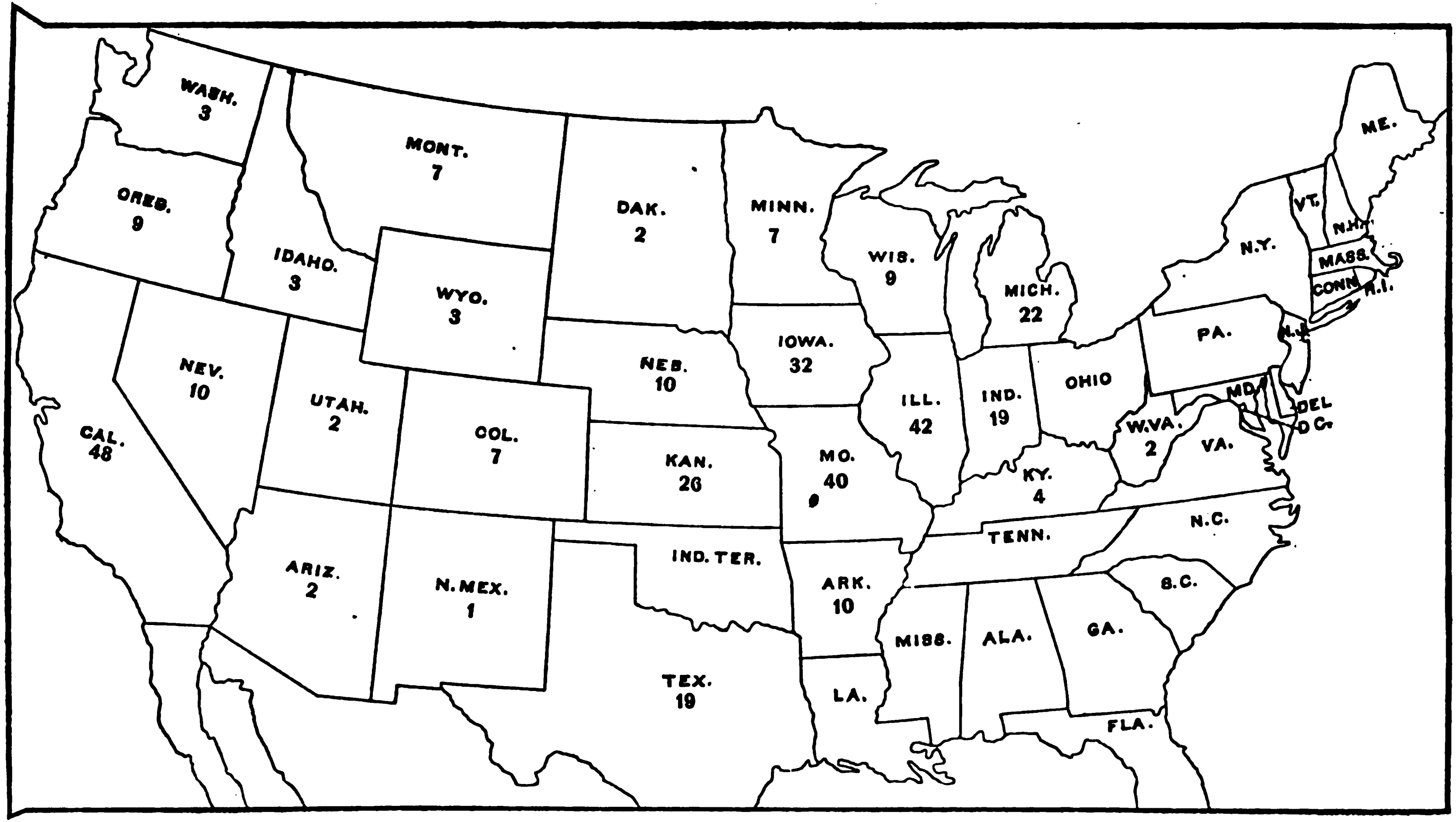


DIAGRAM No. 1.—Excess, in thousands, of native males over native females, 1870.

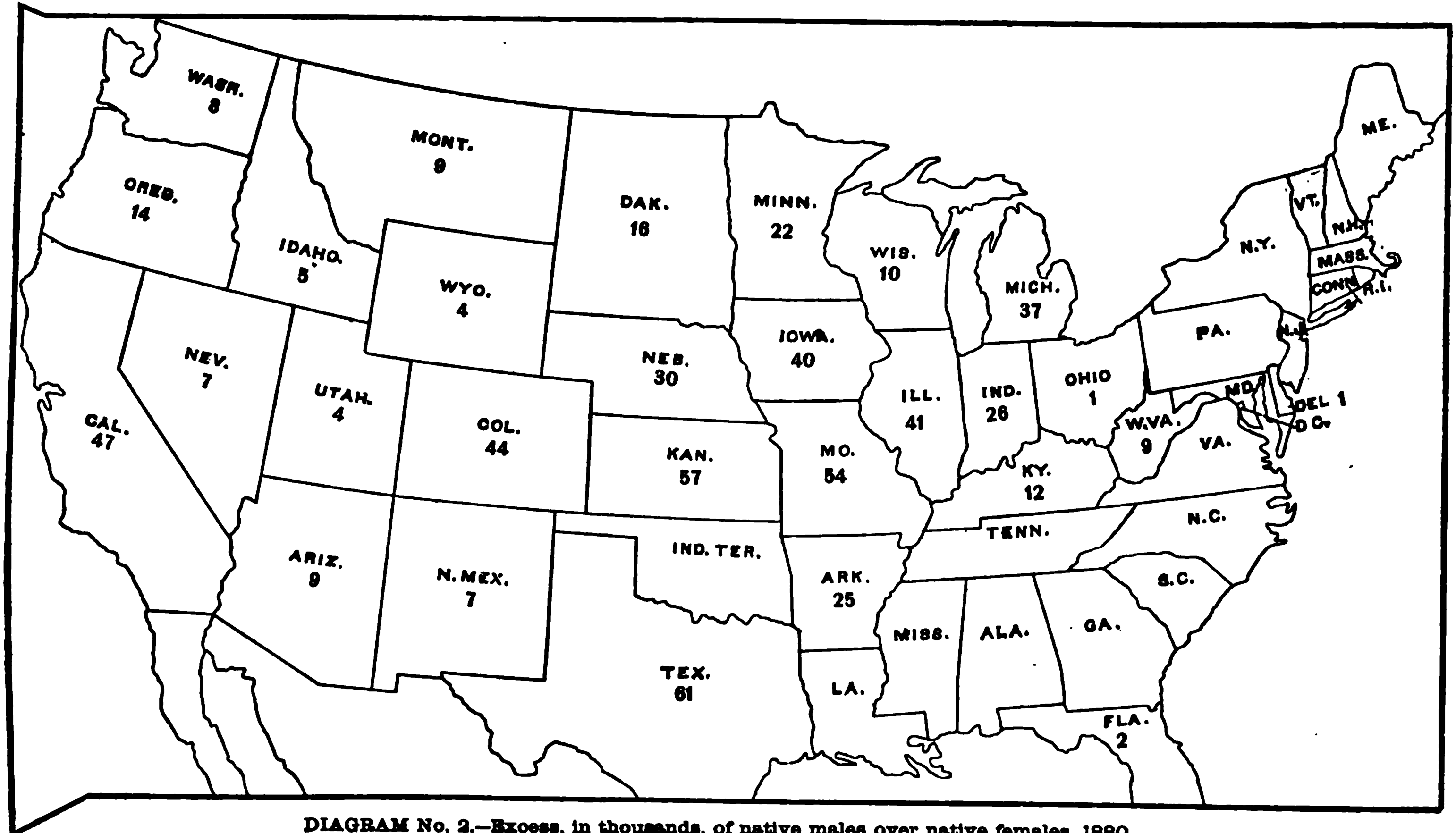


DIAGRAM No. 2.—Excess, in thousands, of native males over native females, 1880.

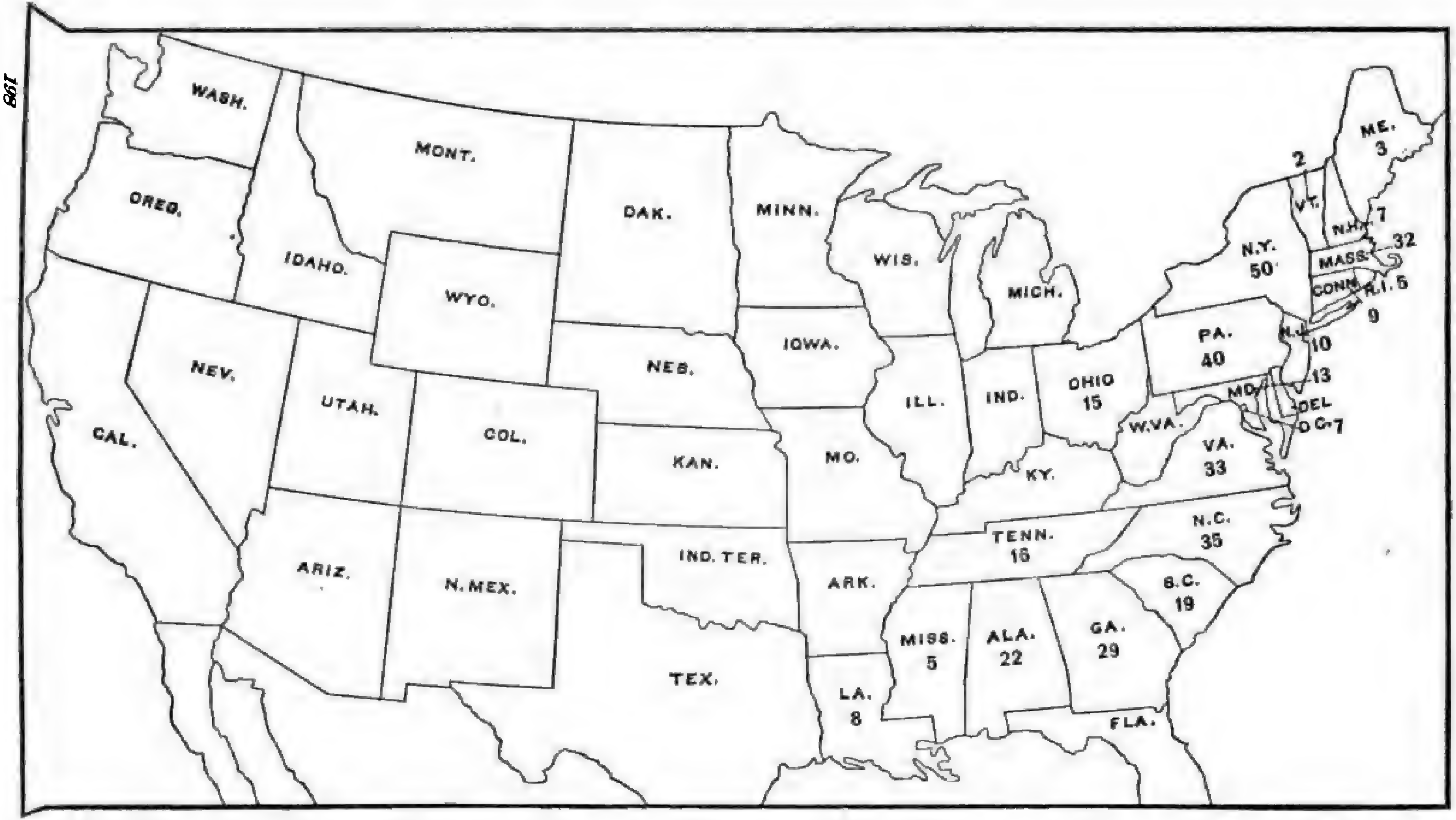


DIAGRAM No. 3.—Excess, in thousands, of native females over native males, 1870.

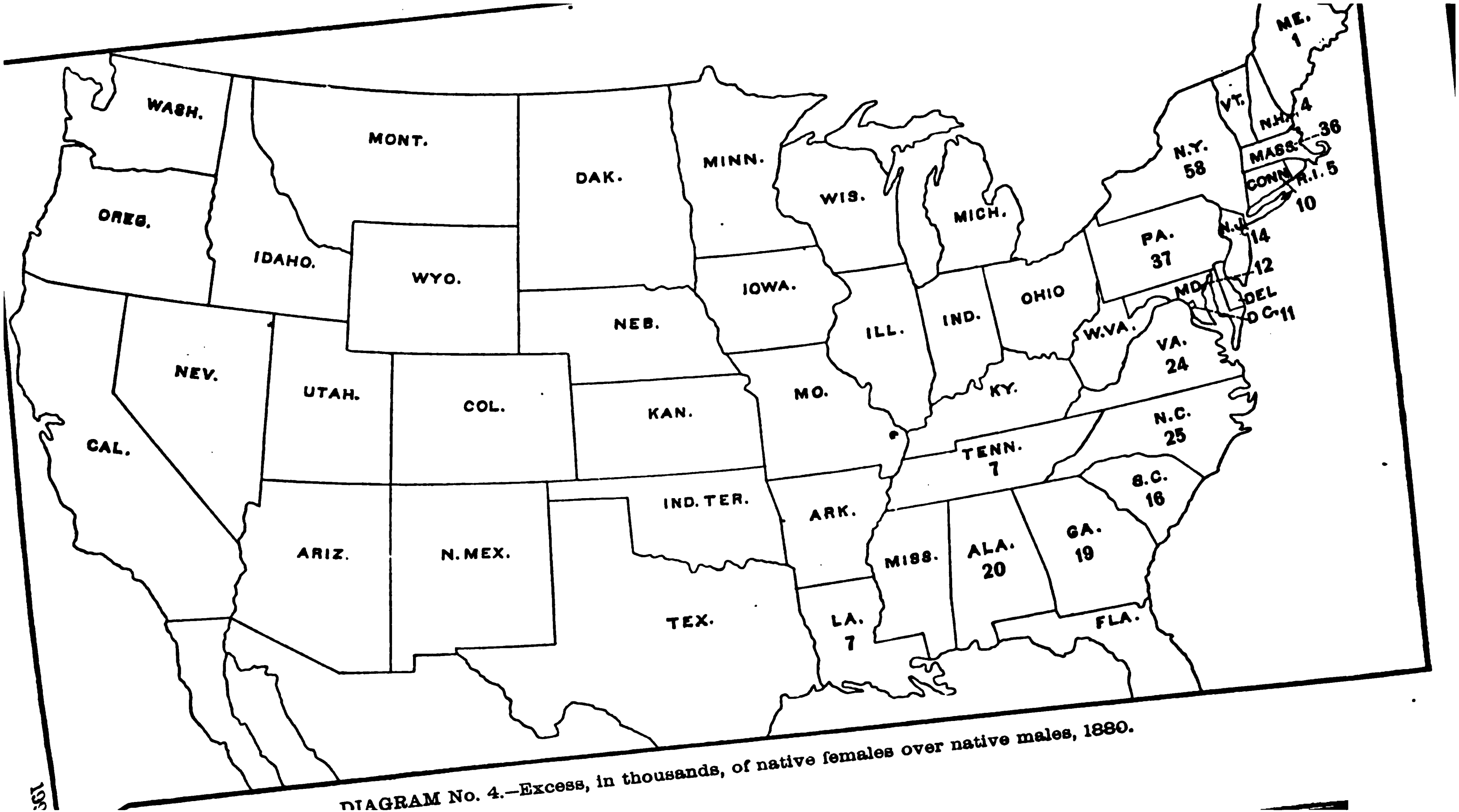


DIAGRAM No. 4.—Excess, in thousands, of native females over native males, 1880.

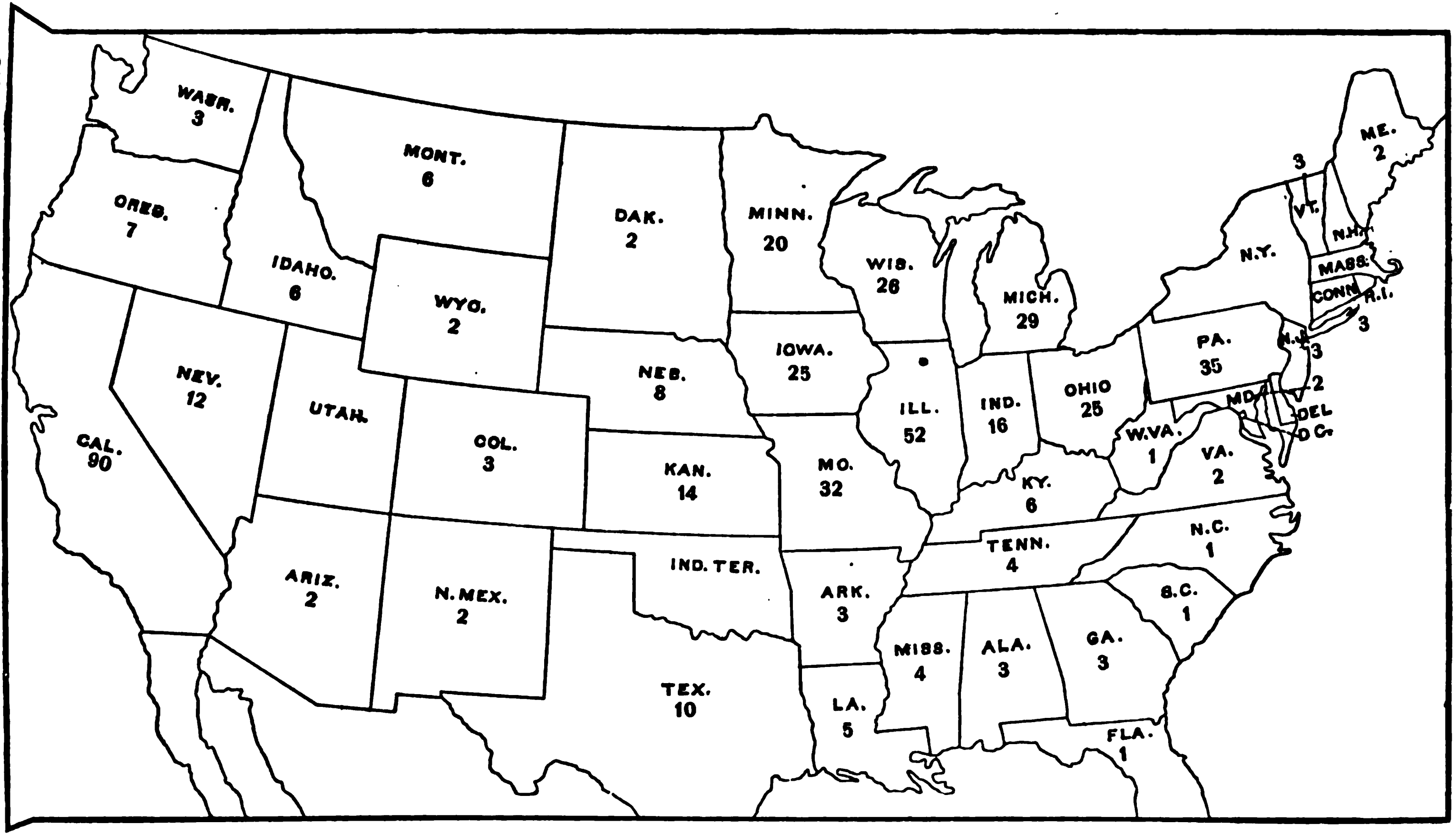


DIAGRAM No. 5.—Excess, in thousands, of foreign-born males over foreign-born females, 1870.

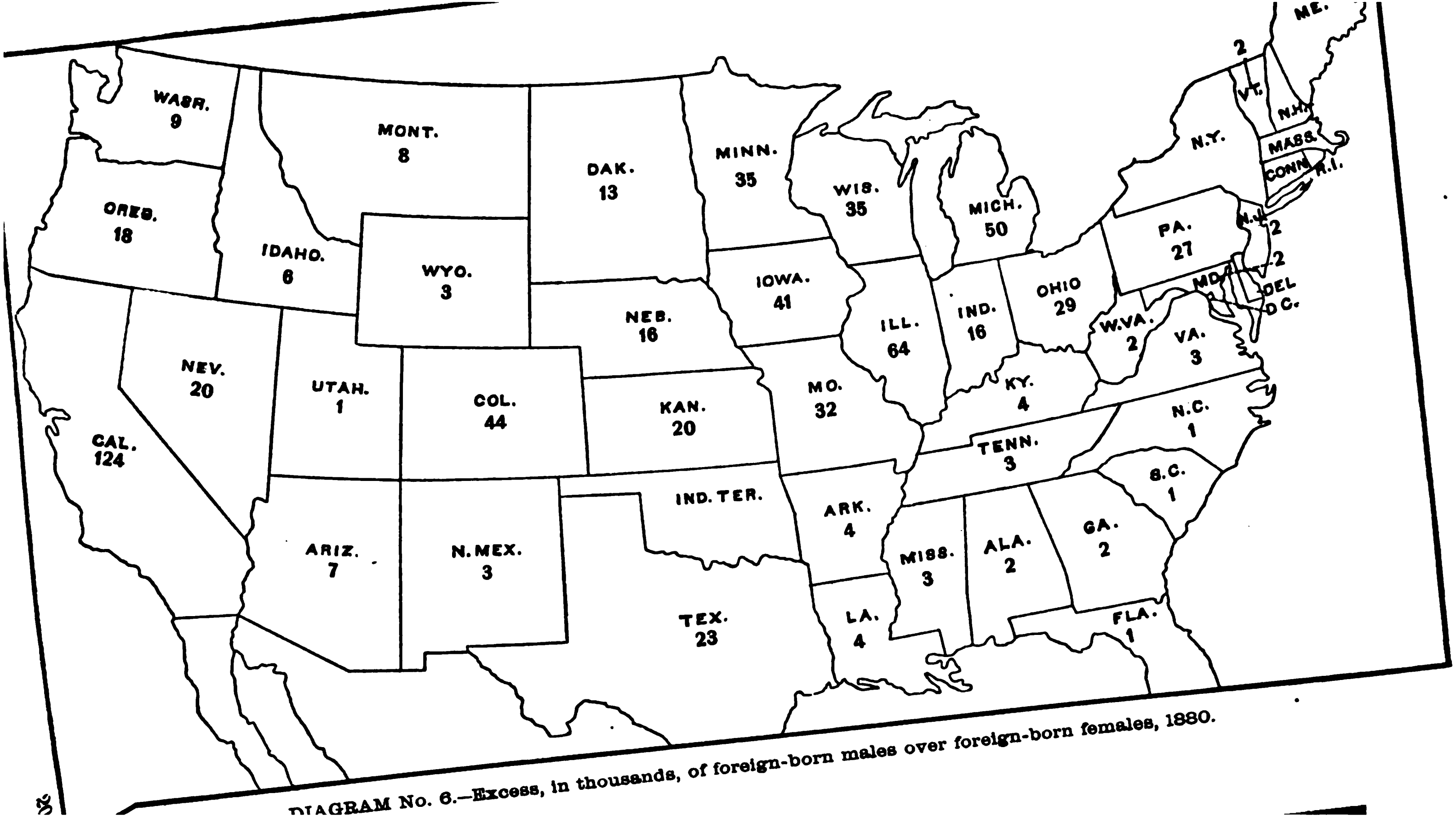


DIAGRAM No. 6.—Excess, in thousands, of foreign-born males over foreign-born females, 1880.

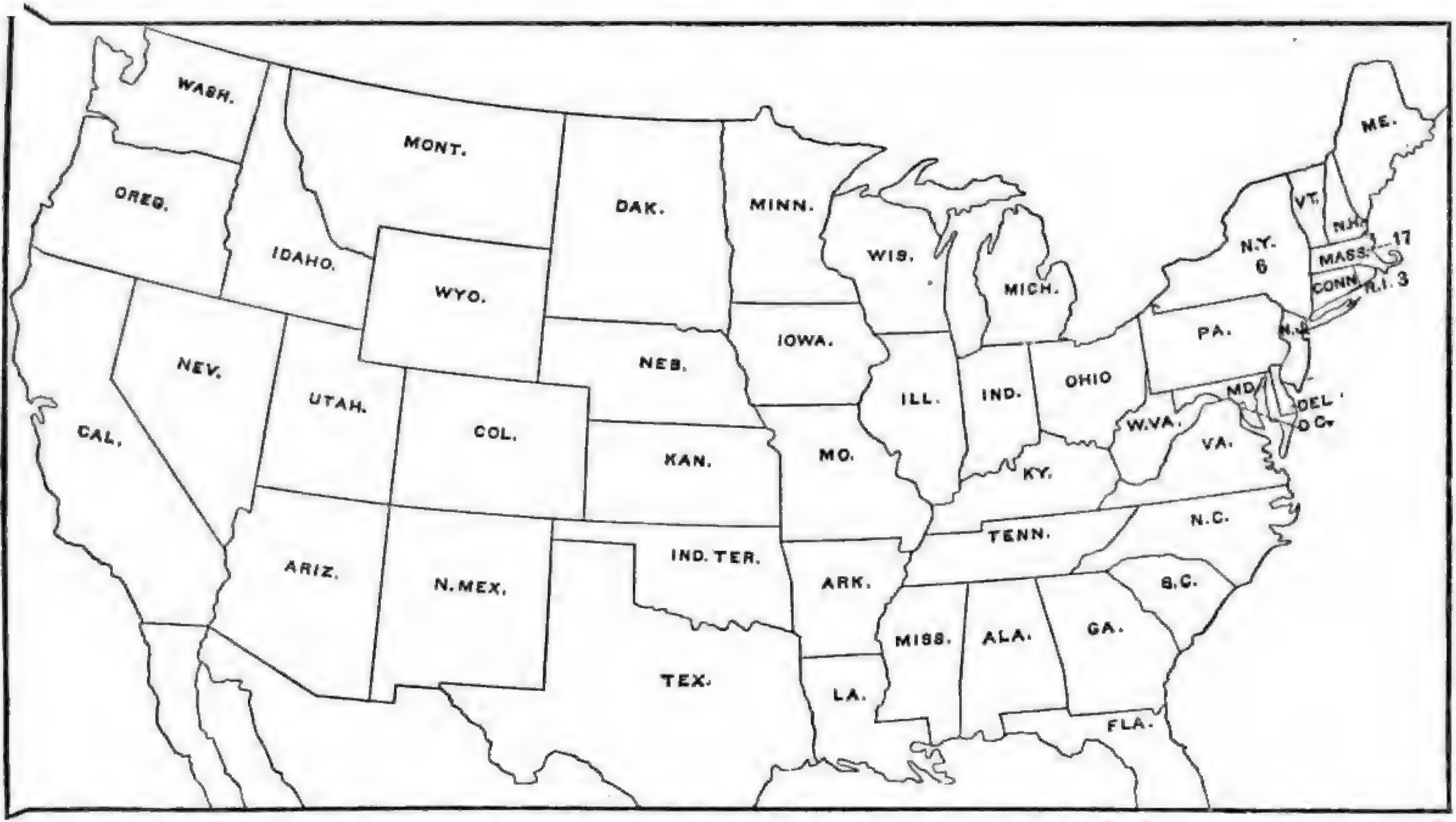


DIAGRAM No. 7.—Excess, in thousands, of foreign-born females over foreign-born males, 1870.

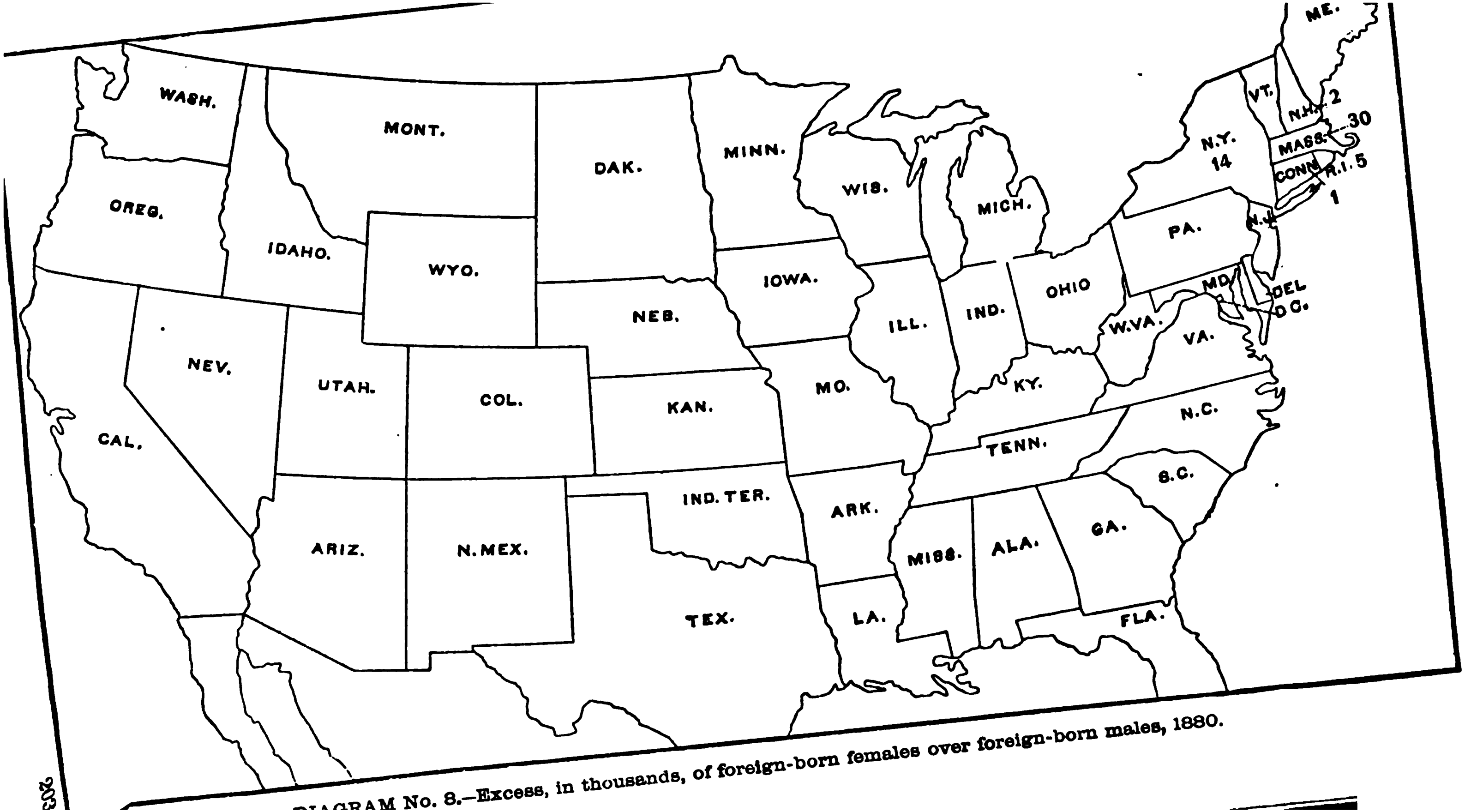


DIAGRAM No. 8.—Excess, in thousands, of foreign-born females over foreign-born males, 1880.

TABLE 3.—*The race and sex of the population of the States and Territories in 1870.*

States and Territories.	Race.							
	White.		Colored.		Chinese and Japanese.		Indians.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Alabama	255, 023	266, 361	238, 677	241, 833	....	....	38	60
Arkansas	186, 445	175, 670	61, 680	60, 489	98	....	38	51
California	297, 648	201, 776	2, 514	1, 758	45, 429	3, 881	3, 888	3, 353
Connecticut	260, 518	267, 031	4, 632	5, 036	2	....	118	117
Delaware	51, 148	51, 078	11, 480	11, 814	....	....	....	....
Florida	48, 953	47, 104	45, 594	46, 095	....	....	1	1
Georgia	311, 171	327, 755	267, 765	277, 377	1	....	18	22
Illinois	1, 301, 583	1, 209, 518	14, 934	13, 828	1	....	19	13
Indiana	845, 307	810, 530	12, 585	11, 975	....	....	102	138
Iowa	622, 786	565, 421	3, 099	2, 663	3	....	29	19
Kansas	198, 200	153, 177	8, 566	8, 542	....	....	458	456
Kentucky	557, 326	541, 366	108, 304	113, 906	1	....	44	64
Louisiana	183, 031	179, 034	178, 784	185, 426	70	1	280	289
Maine	311, 942	312, 867	884	722	1	....	276	223
Maryland	299, 858	305, 689	85, 123	90, 268	1	1	2	2
Massachusetts	696, 925	746, 231	6, 702	7, 245	96	1	56	95
Michigan	609, 046	558, 236	6, 192	5, 657	2	....	2, 505	2, 421
Minnesota	234, 531	203, 726	437	822	....	....	831	359
Mississippi	195, 283	187, 613	217, 722	226, 479	16	....	400	409
Missouri	838, 290	764, 856	58, 028	60, 043	2	1	27	48
Nebraska	69, 242	52, 175	451	338	....	....	82	55
Nevada	29, 284	9, 675	239	118	2, 847	305	9	14
New Hampshire	155, 815	162, 882	314	266	....	....	11	12
New Jersey	434, 588	440, 819	15, 064	15, 594	13	2	7	9
New York	2, 187, 896	2, 192, 814	25, 080	27, 001	29	....	224	215
North Carolina	325, 705	352, 765	192, 418	199, 232	....	....	581	660
Ohio	1, 305, 402	1, 296, 544	32, 090	31, 123	1	....	57	43
Oregon	49, 558	37, 371	219	127	3, 232	98	122	196
Pennsylvania	1, 727, 892	1, 729, 217	31, 077	34, 217	11	3	19	15
Rhode Island	102, 828	109, 891	2, 361	2, 619	....	....	67	87
South Carolina	140, 740	148, 927	203, 104	212, 710	1	....	57	67
Tennessee	466, 505	469, 614	156, 800	165, 531	....	....	42	28
Texas	297, 055	267, 645	126, 278	127, 197	17	8	207	172
Vermont	165, 207	164, 406	506	418	....	....	8	6
Virginia	348, 720	363, 869	248, 228	264, 613	4	....	106	123
West Virginia	213, 871	210, 162	8, 972	9, 008	....	....	....	1
Wisconsin	543, 139	508, 212	1, 189	924	....	....	558	648
Total	16, 812, 661	16, 390, 467	2, 373, 092	2, 462, 014	51, 878	4, 301	10, 737	10, 491
Arizona	6, 834	2, 747	20	6	20	....	13	18
Colorado	24, 465	14, 756	285	171	6	1	64	116
Dakota	8, 255	4, 632	45	49	....	....	578	622
District of Columbia	42, 930	45, 298	19, 197	24, 207	3	....	12	3
Idaho	7, 973	2, 645	42	18	4, 148	126	21	26
Montana	14, 760	3, 546	132	51	1, 826	123	53	104
New Mexico	46, 553	43, 840	116	56	....	....	466	843
Utah	43, 541	42, 503	63	55	429	16	88	91
Washington	14, 143	8, 052	133	74	232	2	482	837
Wyoming	6, 923	1, 808	138	45	138	5	20	46
Total	216, 427	169, 822	20, 171	24, 732	6, 802	273	1, 797	2, 706
Grand total	17, 029, 088	16, 560, 289	2, 393, 263	2, 486, 746	58, 680	4, 574	12, 534	13, 197

TABLE 4.—*The race and sex of the population of the States and Territories in* 1880.

States and Territories.	Race.							
	White.		Colored.		Chinese and Japanese.		Indians.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Alabama	327, 517	334, 668	295, 001	305, 102	4	....	107	106
Arkansas	308, 706	282, 825	107, 331	103, 335	131	2	111	84
California	435, 056	332, 125	3, 467	2, 551	71, 825	3, 893	8, 328	7, 949
Colorado	127, 041	64, 085	1, 433	1, 002	593	19	64	90
Connecticut	299, 980	310, 789	5, 550	5, 997	124	5	128	127
Delaware	60, 777	59, 383	13, 327	13, 115	1	....	3	2
Florida	73, 264	69, 341	63, 068	63, 622	16	2	96	84
Georgia	403, 744	413, 162	359, 157	365, 976	17	......	63	61
Illinois	1, 561, 726	1, 469, 425	24, 507	21, 861	208	4	82	58
Indiana	989, 953	948, 845	20, 267	18, 961	29	....	112	134
Iowa	842, 694	771, 906	5, 191	4, 825	33	....	218	248
Kansas	514, 084	438, 071	22, 152	20, 955	18	1	413	402
Kentucky	698, 757	678, 422	133, 798	137, 653	9	1	26	24
Louisiana	228, 974	225, 980	238, 879	244, 776	460	29	441	407
Maine	322, 973	323, 879	765	686	8	....	312	313
Maryland	359, 670	365, 023	102, 505	107, 725	5	....	7	8
Massachusetts	848, 977	914. 805	9, 049	9, 648	229	8	185	184
Michigan	850, 795	763, 765	7, 836	7, 264	28	....	3, 696	3, 553
Minnesota	417, 075	359, 809	905	659	25	....	1, 144	1, 156
Mississippi	243, 226	236, 172	322, 959	327, 332	51	....	941	916
Missouri	1, 054, 879	967, 947	72, 153	73, 197	91	....	64	49
Nebraska	247, 815	201. 949	1, 296	1, 089	18	....	112	123
Nevada	35, 059	18, 497	308	180	5, 106	313	1, 546	1, 257
New Hampshire	170, 137	176, 092	341	344	14	....	34	29
New Jersey	540, 870	551, 147	18, 846	20, 007	168	4	38	36
New York	2, 473, 121	2, 542, 901	30, 852	34, 252	914	12	435	384
North Carolina	424, 944	442, 298	262, 363	268, 914	1	....	600	630
Ohio	1, 572, 789	1, 545, 131	40, 962	38, 938	112	....	73	57
Oregon	92, 935	70, 140	270	217	9, 348	164	828	866
Pennsylvania	2, 095, 213	2, 101, 803	41, 193	44, 342	148	8	101	83
Rhode Island	130, 014	139, 925	2, 952	3, 536	27	....	37	40
South Carolina	192, 544	198, 561	297, 787	306, 545	9	....	68	63
Tennessee	571, 603	567, 228	197, 467	205, 684	24	1	183	169
Texas	640, 439	556, 798	196, 746	196, 638	134	2	521	471
Vermont	166, 312	164, 906	566	491	....	....	9	2
Virginia	436, 611	444, 227	308, 935	322, 681	6	....	37	48
West Virginia	300, 992	291, 545	13, 482	12, 404	5	....	16	13
Wisconsin	676, 949	632, 669	1, 521	1, 181	14	2	1, 585	1, 576
Total	21, 738, 215	20, 976, 264	3, 225, 187	3, 293, 185	89, 453	4, 470	22, 764	21, 802
Arizona	24, 556	10, 604	104	51	1, 601	81	1, 941	1, 552
Dakota	81, 176	51, 971	225	176	220	18	675	716
District of Columbia	57, 320	60, 686	26, 238	33, 358	15	2	5	....
Idaho	18, 440	10, 573	39	14	3, 256	123	83	82
Montana	25, 522	9, 863	191	155	1, 685	80	779	884
New Mexico	58, 655	50, 066	638	377	54	3	5, 149	4, 623
Utah	73, 477	68, 946	124	108	480	21	428	379
Washington	40, 513	26, 686	209	116	3, 161	26	2, 090	2, 315
Wyoming	13, 026	6, 411	160	138	895	19	71	69
Total	392, 685	295, 806	27, 928	34, 493	11, 367	323	11, 221	10, 620
Grand total	22, 130, 900	21, 272, 070	3, 253, 115	3, 327, 678	100, 820	4, 793	33, 985	32, 422

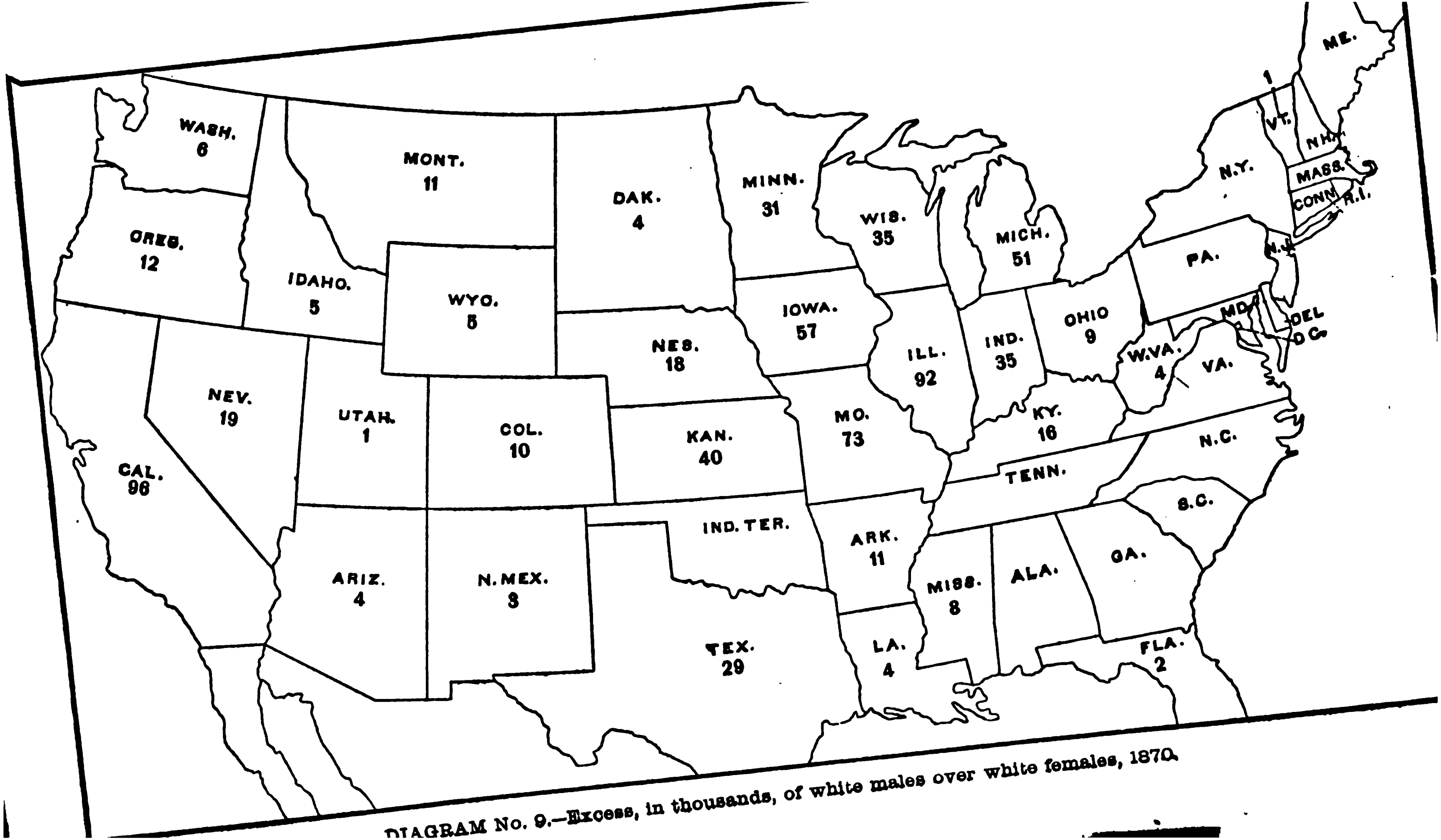


DIAGRAM No. 9.—Excess, in thousands, of white males over white females, 1870.

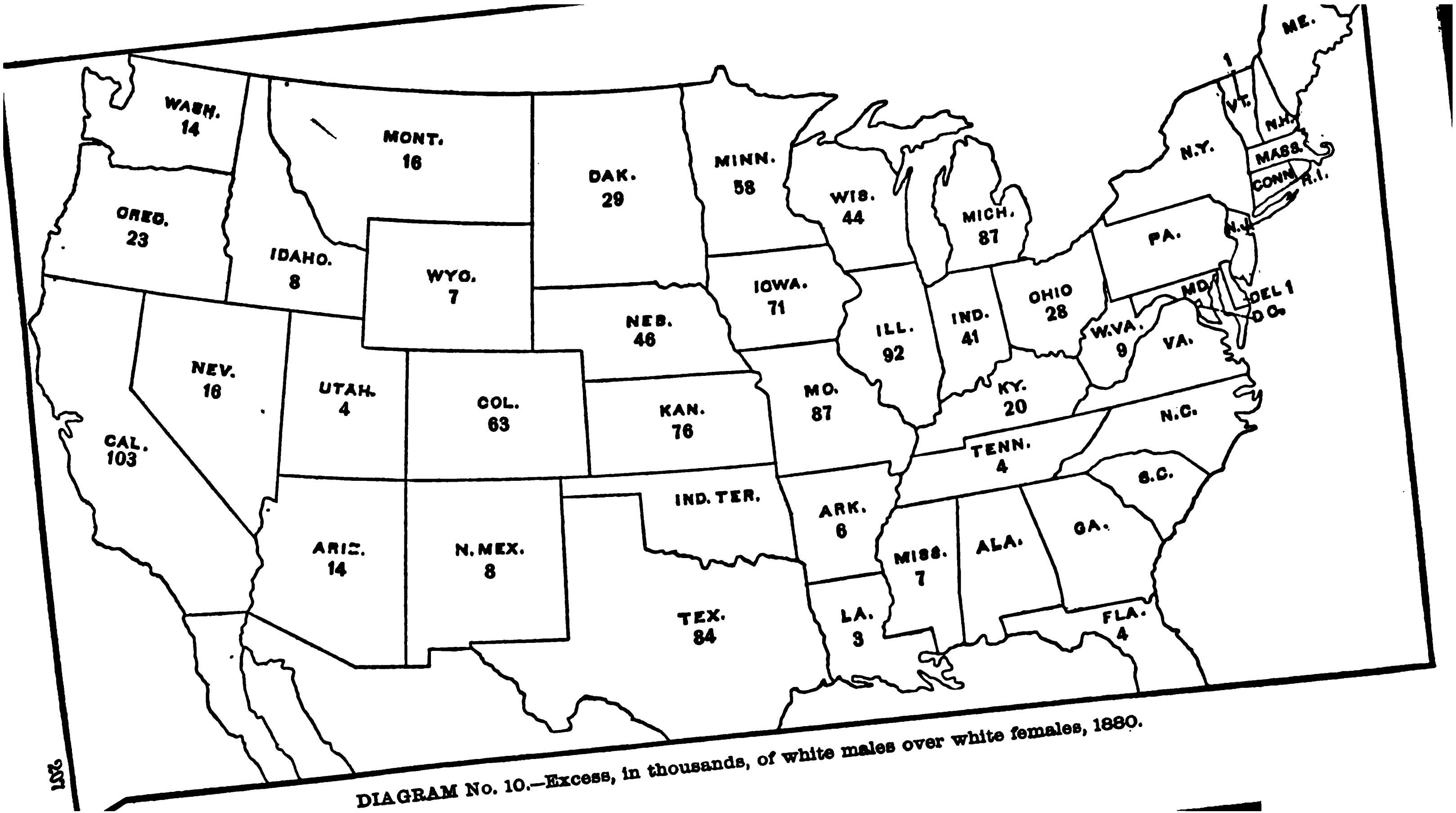


DIAGRAM No. 10.—Excess, in thousands, of white males over white females, 1880.

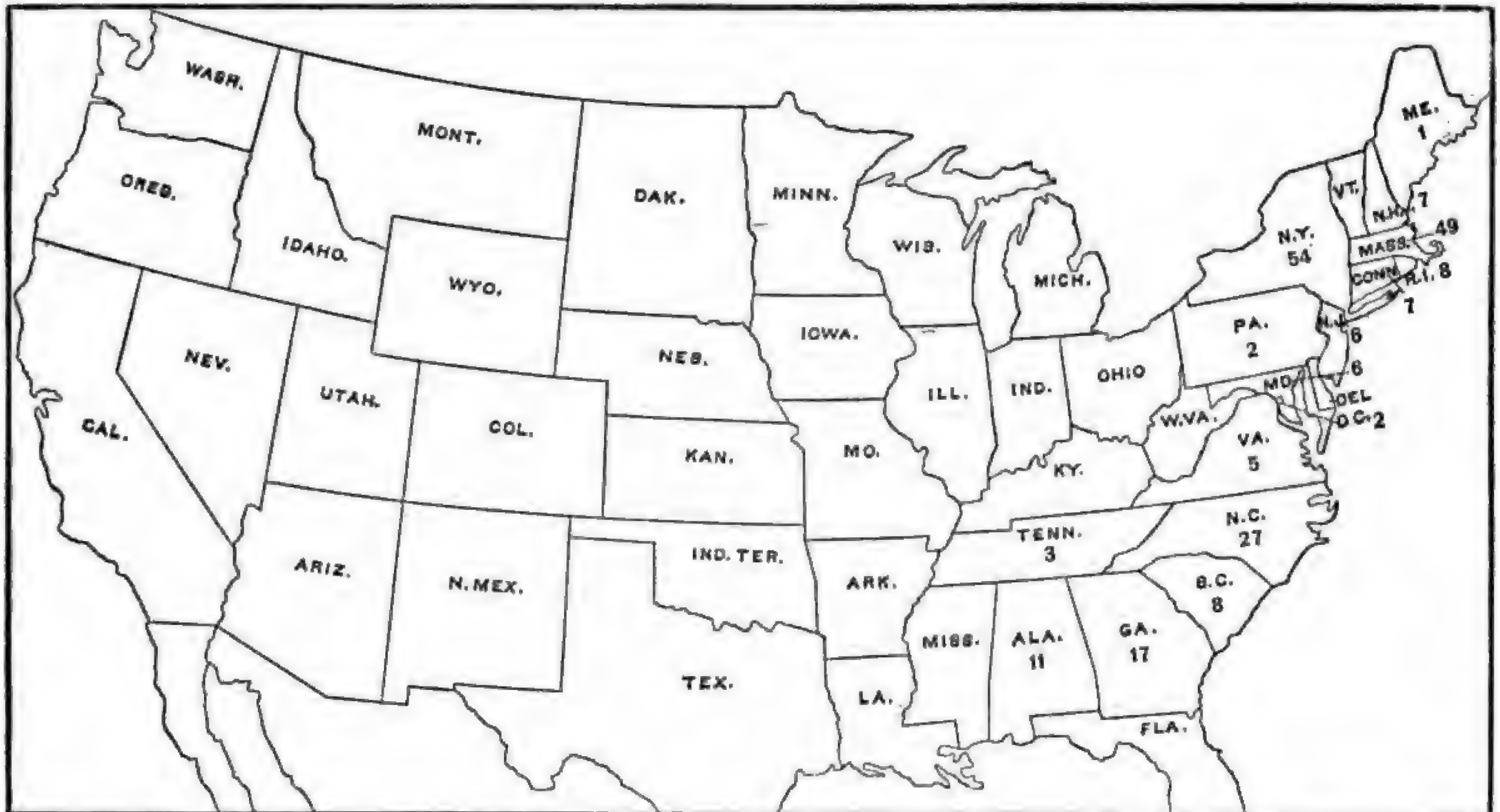


DIAGRAM No. 11.—Excess, in thousands, of white females over white males, 1870.

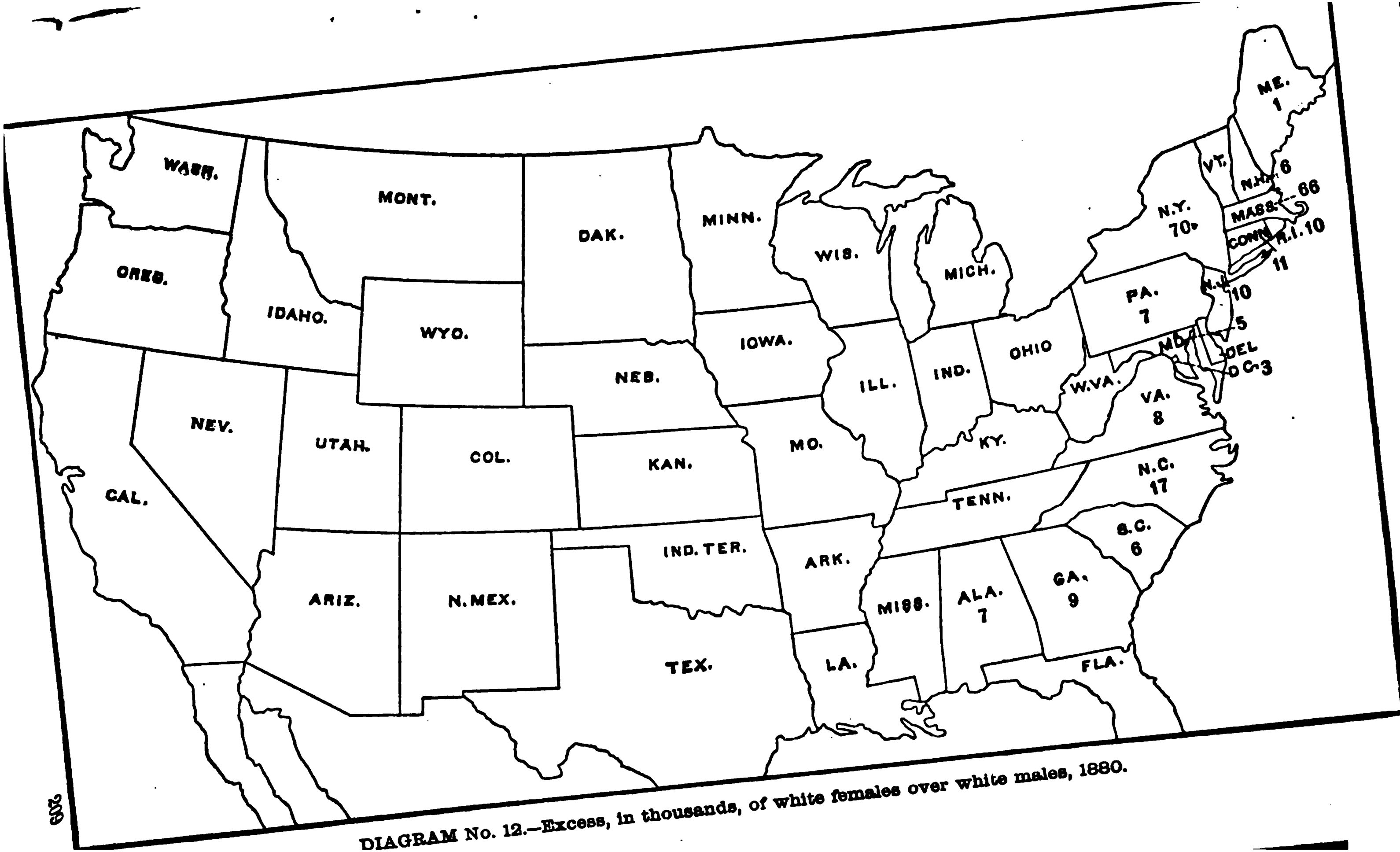


DIAGRAM No. 12.—Excess, in thousands, of white females over white males, 1880.

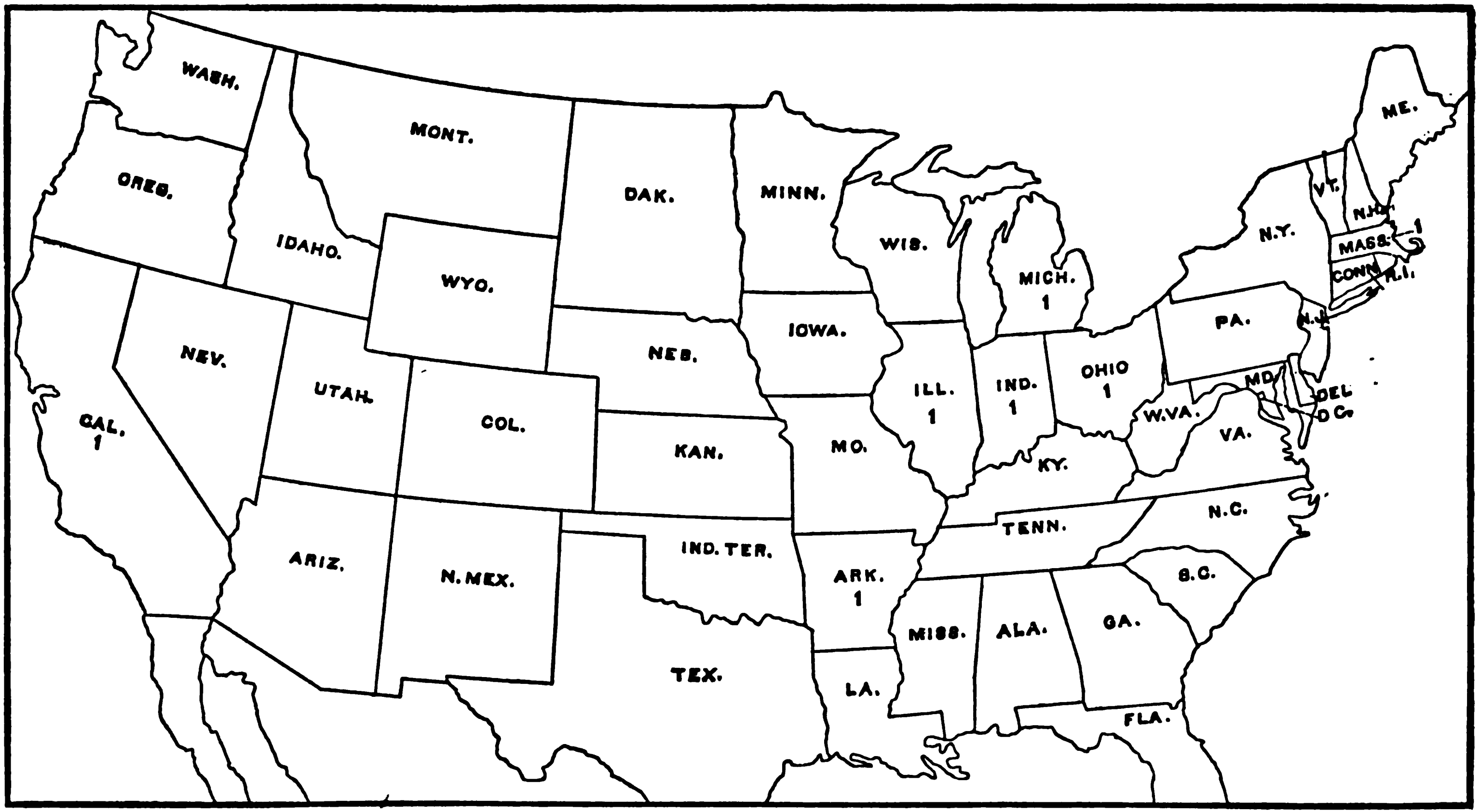


DIAGRAM No. 13.—Excess, in thousands, of colored males over colored females, 1870.

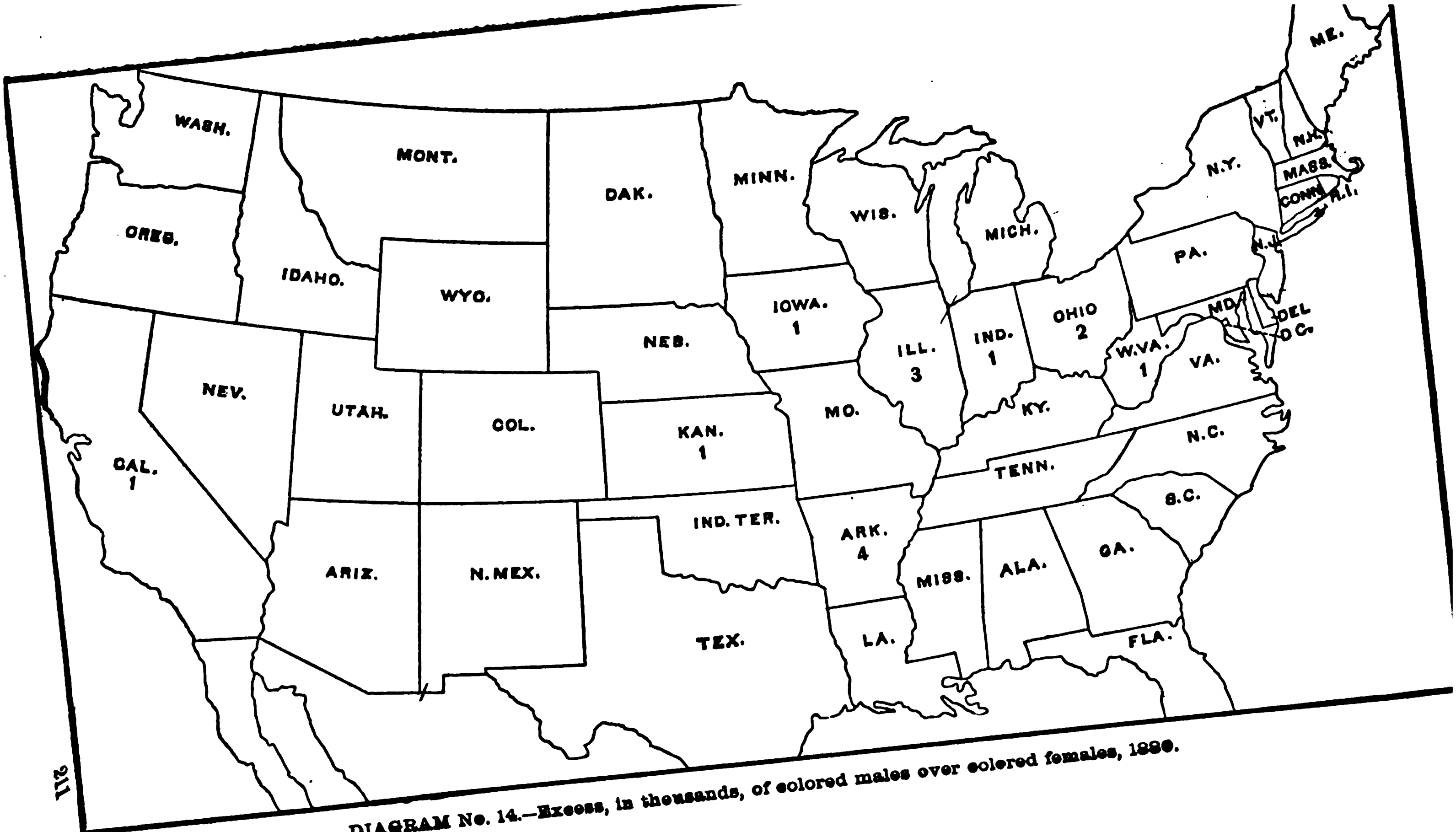


DIAGRAM No. 14.—Excess, in thousands, of colored males over colored females, 1880.

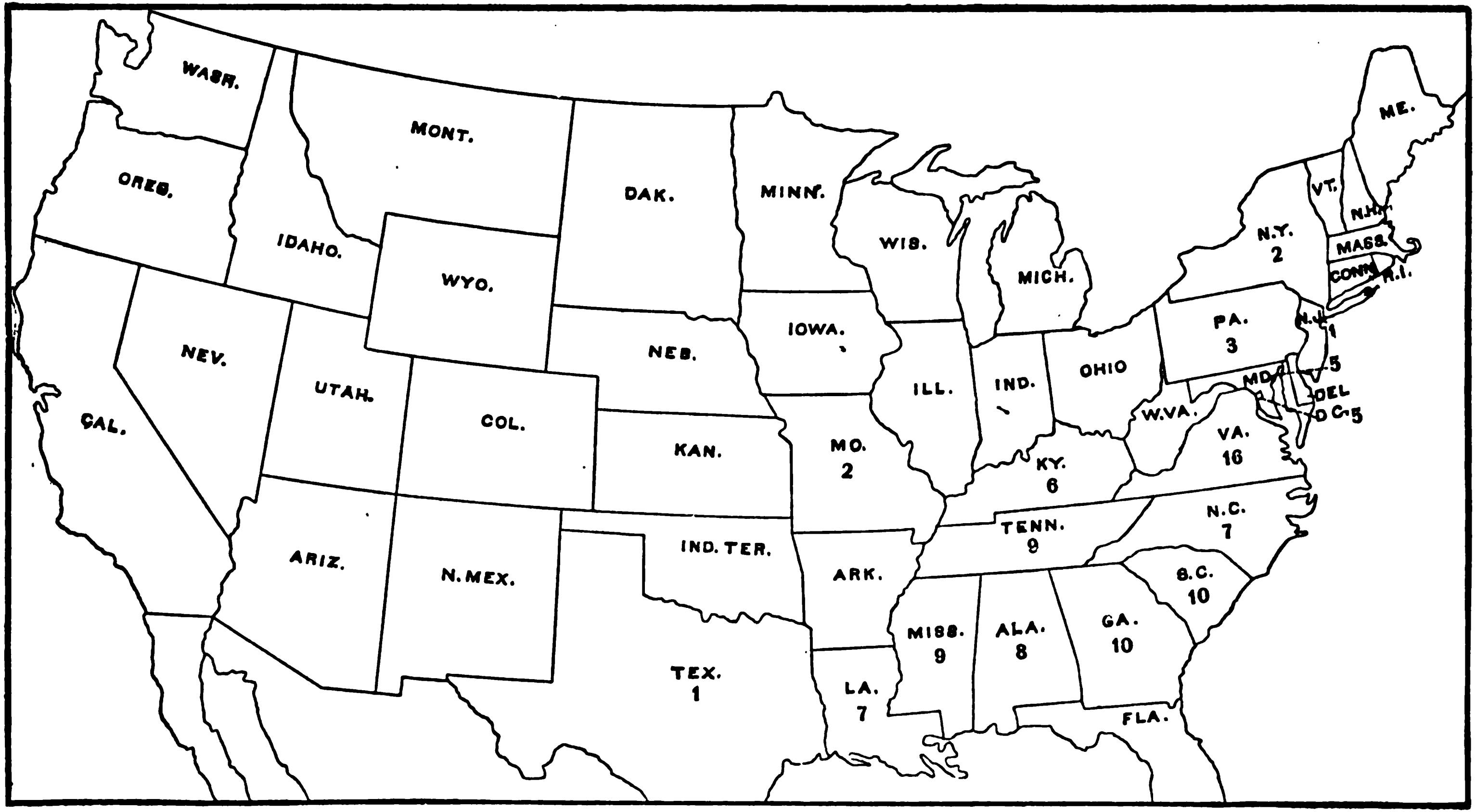


DIAGRAM No. 15.—Excess, in thousands, of colored females over colored males, 1870.

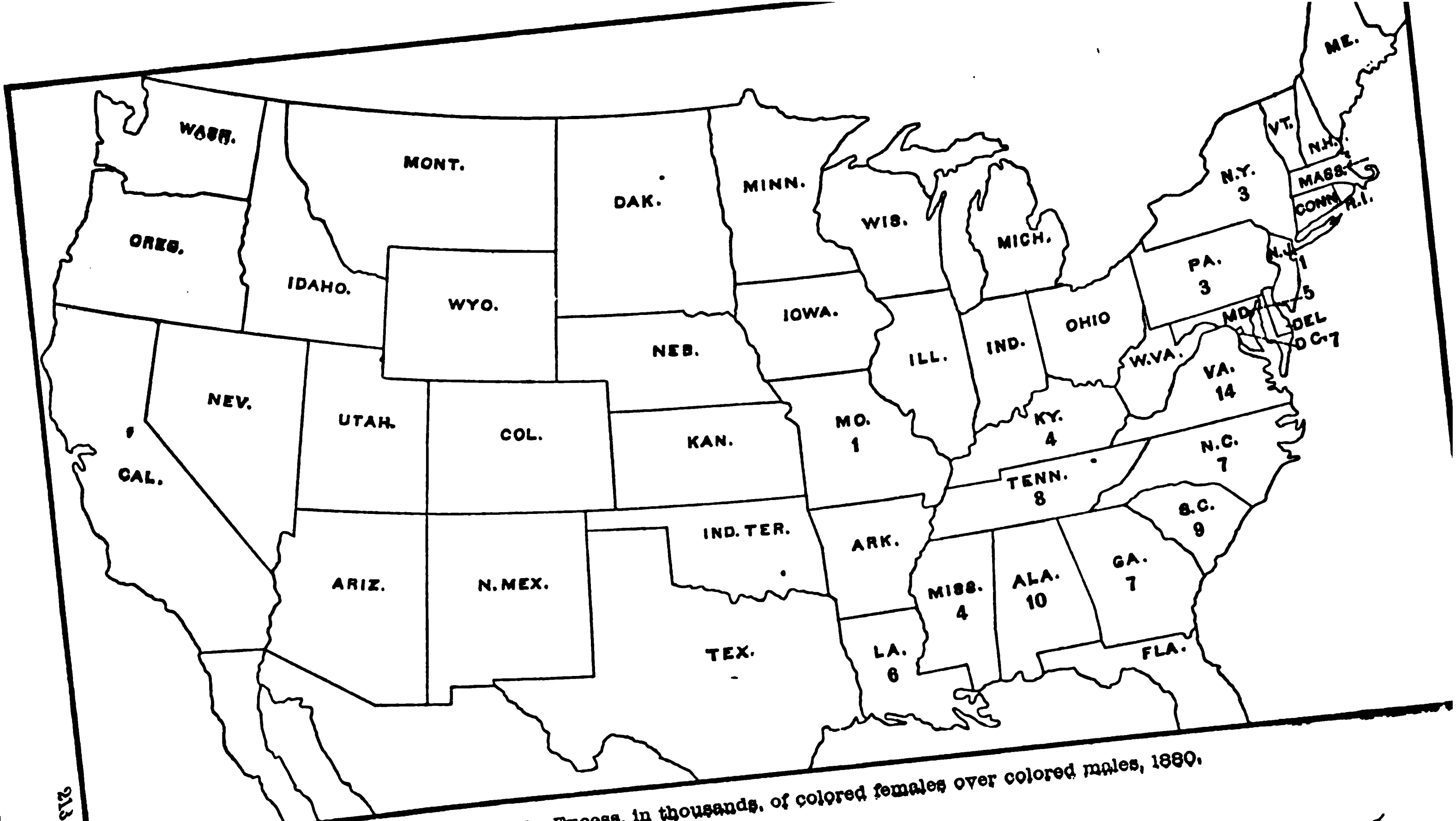


DIAGRAM No. 16.—Excess, in thousands, of colored females over colored males, 1880.

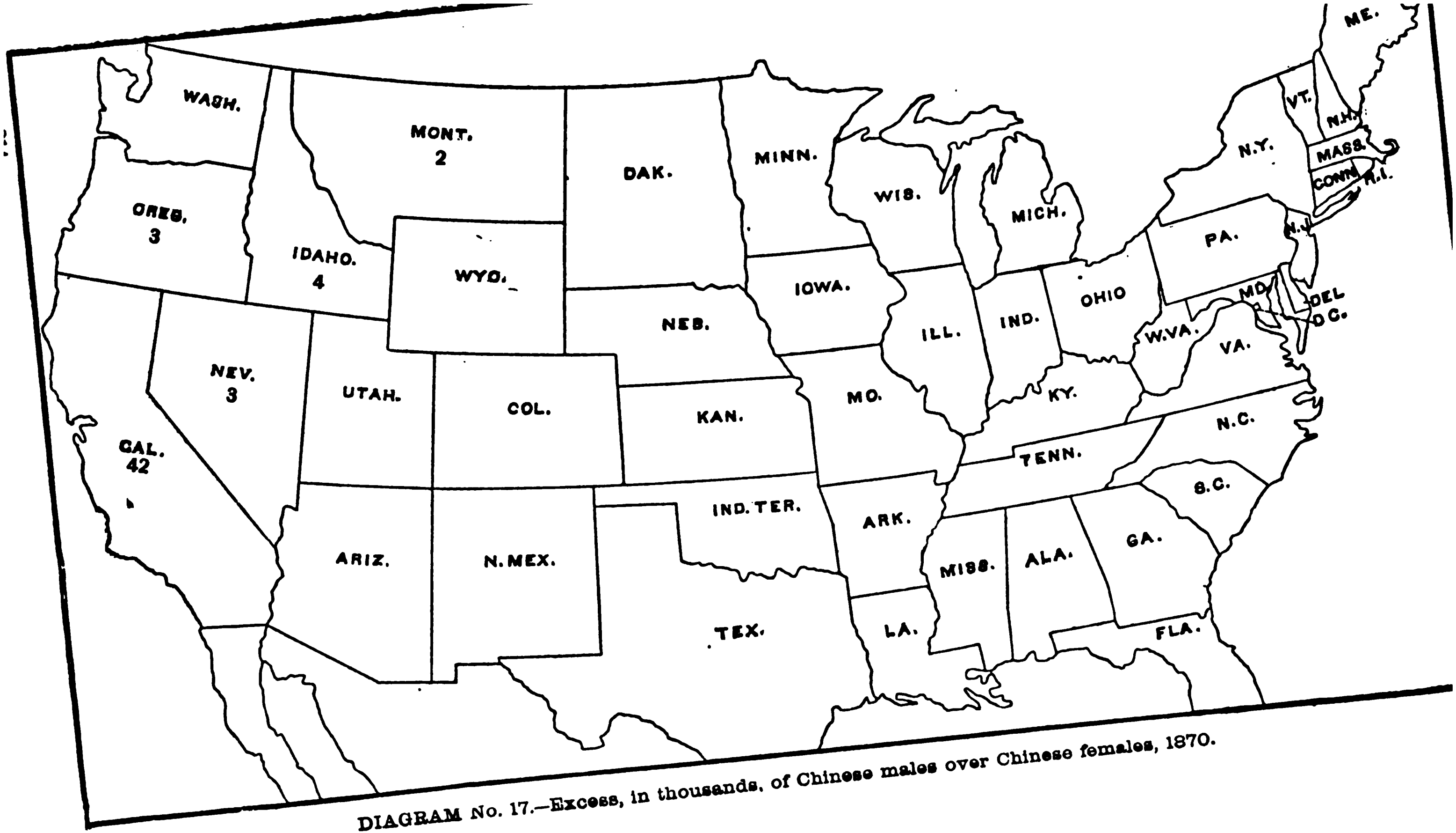


DIAGRAM No. 17.—Excess, in thousands, of Chinese males over Chinese females, 1870.

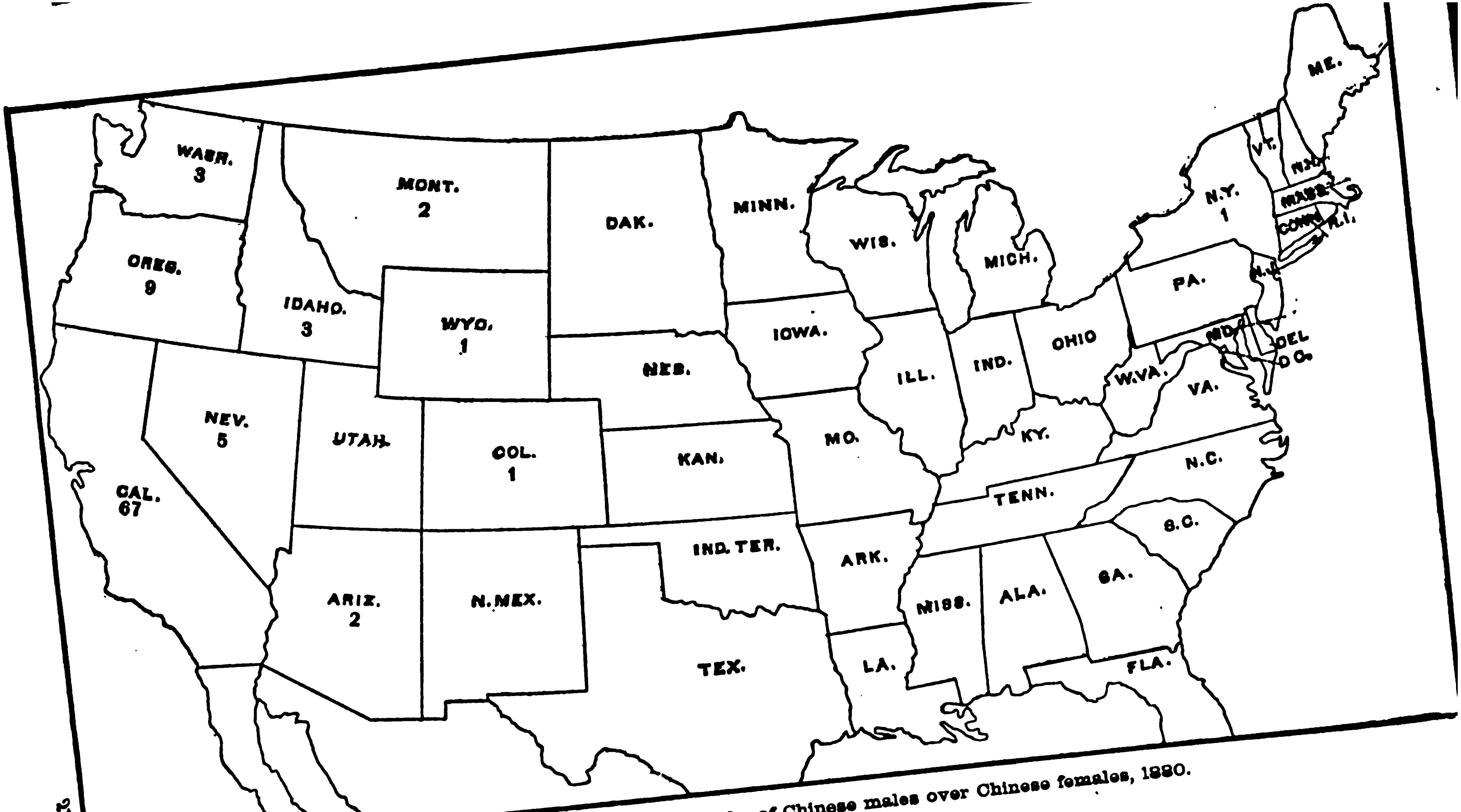


DIAGRAM No. 18.—Excess, in thousands, of Chinese males over Chinese females, 1880.

TABLE 5.—*The native and resident native population of the States and Territories in 1870, the native immigration to and emigration from each, and the excess of native immigration or emigration.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Number of natives—				Excess of native—	
	Living in each State.	Born in each State and living in it.	Living in the State who were born elsewhere.	Born in the State but living in other States.	Immigration.	Emigration.
		*	*	*	*	*
Alabama	987, 030	744, 146	242, 884	229, 554	13, 330	....
Arkansas	479, 445	232, 882	246, 563	54, 950	191, 613	....
California	350, 416	169, 904	180, 512	11, 931	168, 581	....
Connecticut	423, 815	350, 498	73, 317	136, 630	....	63, 313
Delaware	115, 879	94, 754	21, 125	38, 665	....	17, 540
Florida	182, 781	109, 554	73, 227	14, 594	58, 633	....
Georgia	1, 172, 982	1, 033, 962	139, 020	274, 142	....	135, 122
Illinois	2, 024, 693	1, 189, 503	835, 190	289, 907	545, 283	....
Indiana	1, 539, 163	1, 048, 575	490, 588	320, 836	169, 752	....
Iowa	989, 328	428, 620	560, 708	89, 011	471, 697	....
Kansas	316, 007	63, 321	252, 686	10, 769	241, 917	....
Kentucky	1, 257, 613	1, 081, 081	176, 532	403, 126	....	226, 594
Louisiana	665, 088	501, 864	163, 224	63, 133	100, 091	....
Maine	578, 034	550, 629	27, 405	149, 205	....	121, 800
Maryland	697, 482	629, 882	67, 600	175, 666	....	108, 066
Massachusetts	1, 104, 032	903, 297	200, 735	243, 880	....	43, 145
Michigan	916, 049	507, 268	408, 781	65, 720	343, 061	....
Minnesota	279, 009	126, 491	152, 518	12, 540	139, 978	....
Mississippi	816, 731	564, 142	252, 589	138, 542	114, 047	....
Missouri	1, 499, 028	874, 006	625, 022	171, 262	453, 760	....
Nebraska	92, 245	18, 530	73, 715	4, 704	69, 011	....
Nevada	23, 690	3, 356	20, 334	1, 532	18, 802	....
New Hampshire	288, 689	242, 374	46, 315	124, 972	....	78, 657
New Jersey	717, 153	575, 245	141, 908	148, 830	....	6, 922
New York	3, 244, 406	2, 987, 776	256, 630	1, 073, 572	....	816, 942
North Carolina	1, 068, 332	1, 028, 678	39, 654	307, 362	....	267, 708
Ohio	2, 292, 767	1, 842, 313	450, 454	806, 983	....	356, 529
Oregon	79, 323	37, 155	42, 168	6, 225	35, 943	....
Pennsylvania	2, 976, 642	2, 726, 712	249, 930	674, 544	....	424, 614
Rhode Island	161, 957	125, 269	36, 688	45, 371	....	8, 683
South Carolina	697, 532	678, 708	18, 824	246, 066	....	227, 242
Tennessee	1, 239, 204	1, 027, 653	211, 551	403, 696	....	192, 145
Texas	756, 168	388, 510	367, 658	25, 590	342, 068	.....
Vermont	283, 396	243, 814	39, 582	177, 164	....	137, 582
Virginia	1, 211, 409	1, 162, 822	48, 587	585, 094	See text..	492, 881
West Virginia	424, 923	381, 297	43, 626			
Wisconsin	690, 171	450, 272	239, 899	96, 951	142, 948	....
Arizona	3, 849	1, 240	2, 609	400	2, 209	....
Colorado	33, 265	6, 344	26, 921	1, 235	25, 686	....
Dakota	9, 366	2, 088	7, 278	370	6, 908	....
District of Columbia	115, 446	52, 340	63, 106	15, 207	47, 899	....
Idaho	7, 114	946	6, 168	553	5, 615	....
Montana	12, 616	1, 693	10, 923	504	10, 419	....
New Mexico	86, 254	83, 175	3, 079	9, 111	....	6, 032
Utah	56, 084	41, 426	14, 658	3, 674	10, 984	....
Washington	18, 931	6, 932	11, 999	1, 042	10, 957	....
Wyoming	5, 605	293	5, 312	242	5, 070	....
Unclassified	....	....	....	14, 745	....	14, 745
Total	**32, 991, 142**	**25, 321, 340**	**7, 669, 802**	**7, 669, 802**	**3, 746, 262**	**3, 746, 262**

TABLE 6.—*The native and resident native population of the States and Territories in 1880, the native immigration to and emigration from each, and the excess of native immigration or emigration.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Number of natives—				Excess of native—	
	Living in each State.	Born in each State and living in it.	Living in the State who were born elsewhere.	Born in the State but living in other States.	Immigration.	Emigration.
			*	*	*	*
Alabama	1, 252, 771	1, 014, 633	238, 138	304, 556	....	66, 418
Arkansas	792, 175	436, 677	355, 498	84, 063	271, 435	....
California	571, 820	326, 000	245, 820	29, 157	216, 663	....
Colorado	154, 537	26, 363	128, 174	5, 464	122, 710	....
Connecticut	492, 708	398, 211	94, 497	140, 621	....	46, 124
Delaware	137, 140	110, 643	26, 497	44, 874	....	18, 377
Florida	259, 584	173, 481	86, 103	21, 037	65, 066	....
Georgia	1, 531, 616	1, 395, 214	136, 402	323, 854	....	187, 452
Illinois	2, 494, 295	1, 709, 520	784, 775	553, 889	230, 886	....
Indiana	1, 834, 123	1, 354, 565	479, 558	443, 925	35, 633	....
Iowa	1, 362, 965	737, 306	625, 659	217, 389	408, 270	....
Kansas	886, 010	233, 066	652, 944	46, 085	606, 859	....
Kentucky	1, 589, 173	1, 402, 112	187, 061	454, 198	....	267, 137
Louisiana	885, 800	728, 322	157, 478	89, 170	68, 308	....
Maine	590, 053	563, 015	27, 038	182, 257	....	155, 219
Maryland	852, 137	762, 641	89, 496	195, 500	....	106, 004
Massachusetts	1, 339, 594	1, 088, 565	251, 029	267, 730	....	16, 701
Michigan	1, 248, 429	803, 306	445, 123	117, 355	327, 768	....
Minnesota	513, 097	302, 371	210, 726	39, 379	171, 347	....
Mississippi	1, 122, 388	863, 185	259, 203	193, 808	65, 395	....
Missouri	1, 956, 802	1, 268, 641	688, 161	298, 643	389, 518	....
Nebraska	354, 988	95, 790	259, 198	17, 688	241, 510	....
Nevada	36, 613	13, 732	22, 881	4, 524	18, 357	....
New Hampshire	300, 697	242, 757	57, 940	128, 505	....	70, 565
New Jersey	909, 416	725, 614	183, 802	180, 391	3, 411	....
New York	3, 871, 492	3, 556, 394	315, 098	1, 197, 153	....	882, 055
North Carolina	1, 396, 008	1, 344, 553	51, 455	293, 505	....	242, 050
Ohio	2, 803, 119	2, 361, 437	441, 682	941, 219	....	499, 537
Oregon	144, 265	67, 942	76, 323	13, 666	62, 657	....
Pennsylvania	3, 695, 062	3, 385, 693	309, 369	798, 487	....	489, 118
Rhode Island	202, 538	152, 487	50, 051	49, 235	816	....
South Carolina	987, 891	952, 395	35, 496	230, 916	....	195, 420
Tennessee	1, 525, 657	1, 313, 552	212, 105	473, 952	....	261, 847
Texas	1, 477, 133	870, 705	606, 428	44, 315	562, 113	....
Vermont	291, 327	251, 780	39, 547	178, 261	....	138, 714
Virginia	1, 497, 869	1, 435, 124	62, 745	683, 336	....	620, 591
West Virginia	600, 192	397, 267	202, 925	42, 946	159, 979	....
Wisconsin	910, 072	693, 177	216, 895	200, 768	16, 127	....
Arizona	24, 391	8, 166	16, 225	923	15, 302	....
Dakota	83, 382	17, 796	65, 586	2, 844	62, 742	....
District of Columbia	160, 502	80, 702	79, 800	21, 726	58, 074	....
Idaho	22, 636	5, 992	16, 644	1, 761	14, 883	....
Montana	27, 638	7, 225	20, 413	1, 462	18, 951	....
New Mexico	111, 514	101, 046	10, 468	12, 742	....	2, 274
Utah	99, 969	81, 716	18, 253	10, 414	7, 839	....
Washington	59, 313	19, 359	39, 954	3, 066	36, 888	....
Wyoming	14, 939	2, 496	12, 443	1, 595	10, 848	....
Unclassified	....	....	....	4, 752	....	4, 752
Total	43, 475, 840	33, 882, 734	9, 593, 106	9, 593, 106	4, 270, 355	4, 270, 355

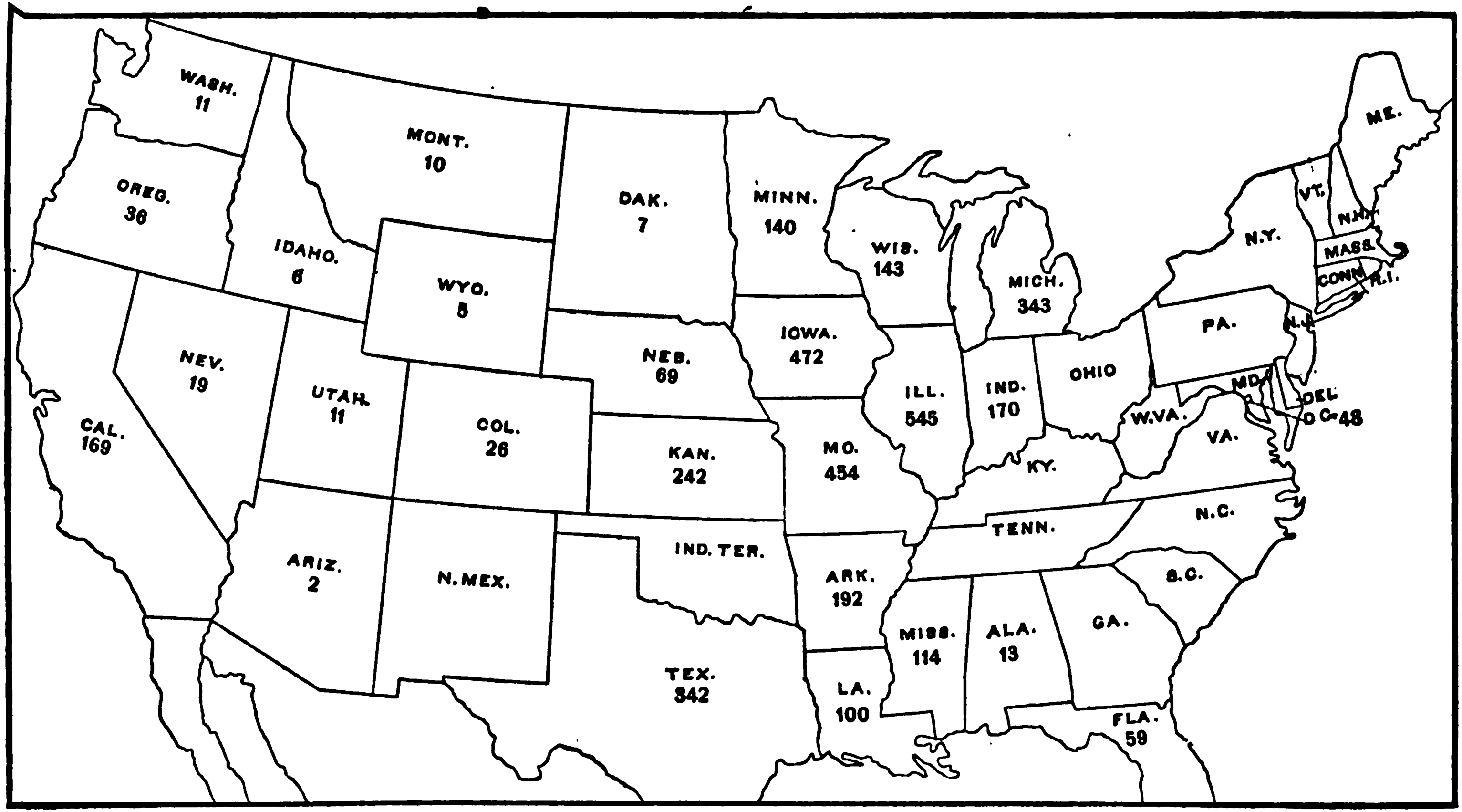


DIAGRAM No. 19.—Excess, in thousands, of native immigrants over native emigrants, in the population of 1870.

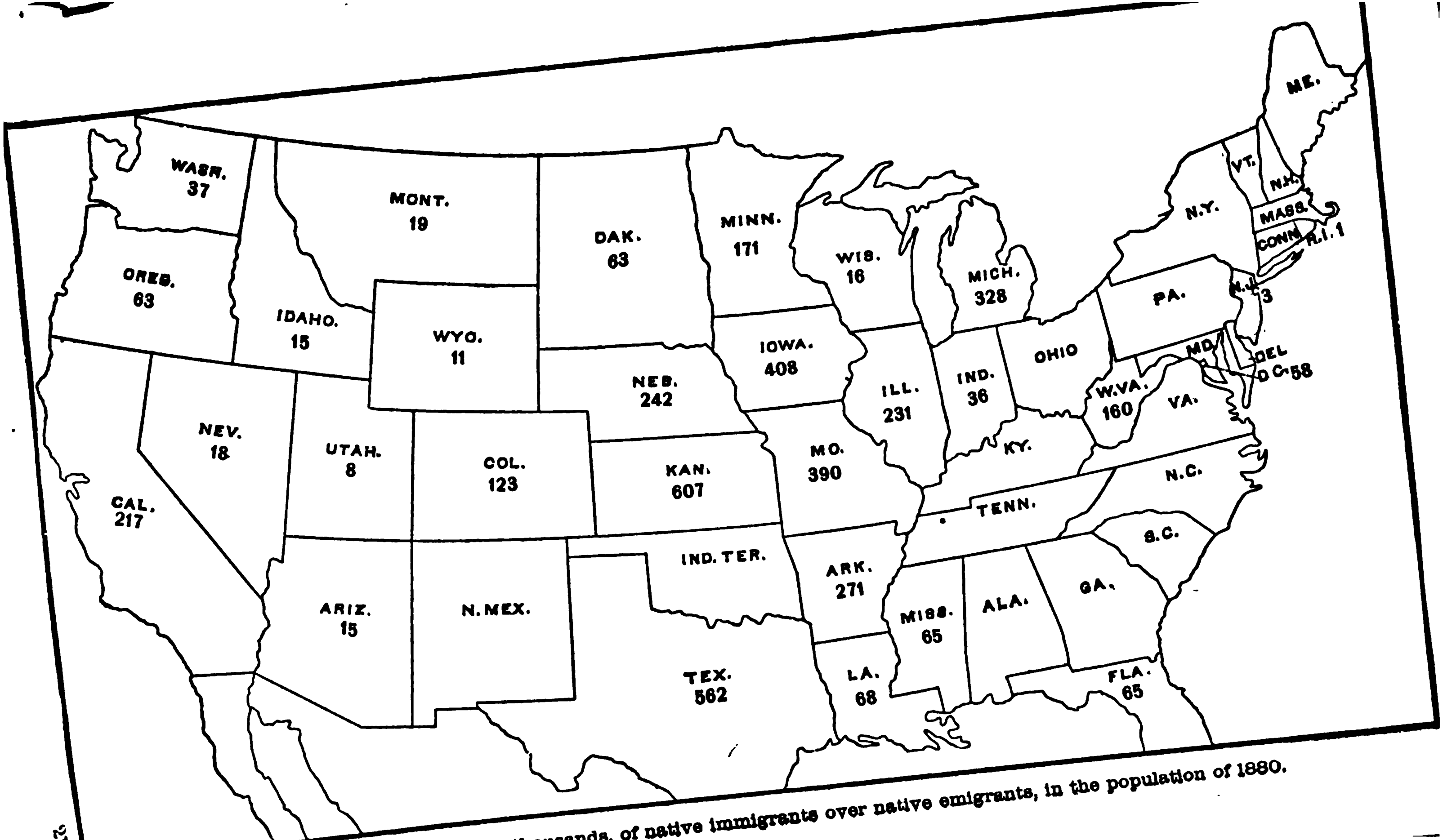


DIAGRAM No. 20.—Excess, in thousands, of native immigrants over native emigrants, in the population of 1880.

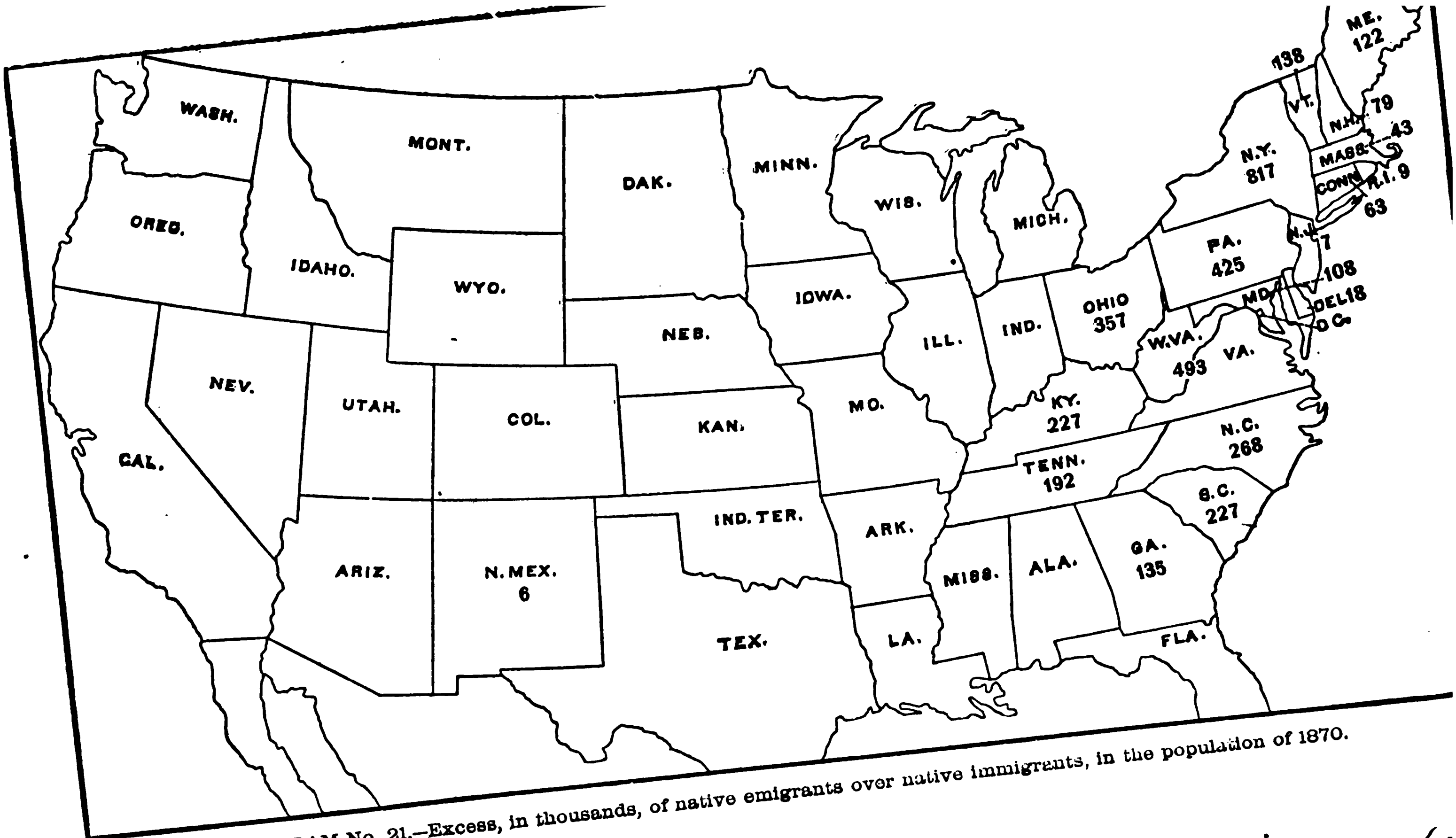
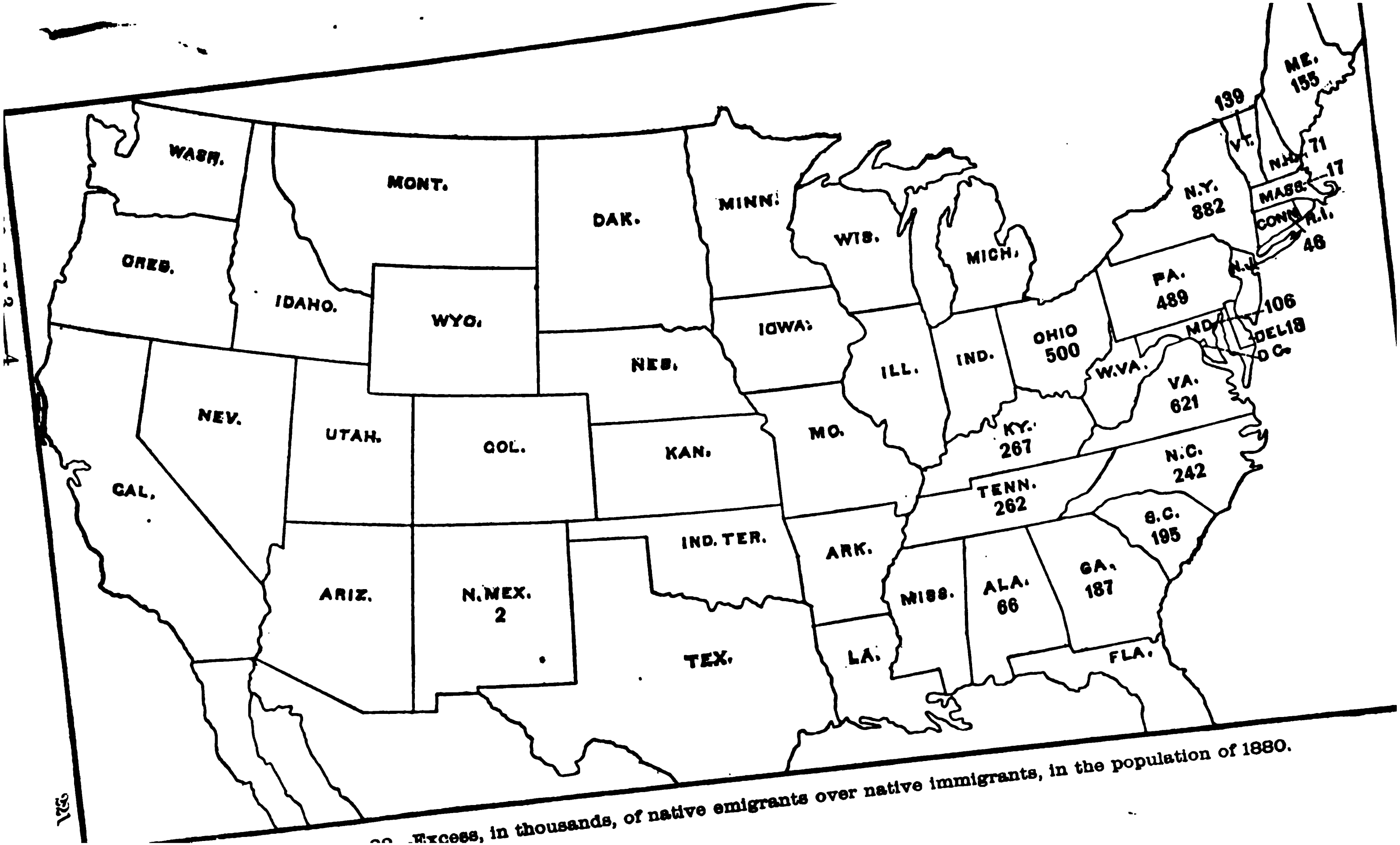


DIAGRAM No. 21.—Excess, in thousands, of native emigrants over native immigrants, in the population of 1870.



Excess, in thousands, of native emigrants over native immigrants, in the population of 1880.

TABLE 7.—*The special nativity of the foreign-born population in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Number of foreign-born inhabitants born in— All foreign countries.	German Empire.	Ireland.	Great Britain. *	British America.	Sweden, Norway, and Denmark. *	Other foreign countries. *
Alabama	9,962	2,482	3,893	1,538	183	206	1,660
Arkansas	5,026	1,563	1,428	706	342	209	778
California	209,831	29,701	54,421	24,165	10,660	4,781	86,103
Connecticut	113,639	12,443	70,630	16,527	10,861	511	2,667
Delaware	9,136	1,142	5,907	1,693	112	17	265
Florida	4,967	597	737	540	174	87	2,823
Georgia	11,127	2,761	5,093	1,569	247	91	1,366
Illinois	515,198	203,758	120,162	72,754	32,550	45,570	40,404
Indiana	141,474	78,060	28,698	13,008	4,765	2,618	14,325
Iowa	204,692	66,162	40,124	23,875	17,907	31,179	25,445
Kansas	48,392	12,775	10,940	8,713	5,324	6,045	4,595
Kentucky	63,398	30,318	21,612	5,539	1,082	181	4,666
Louisiana	61,827	18,933	17,068	3,739	714	725	20,648
Maine	48,881	508	15,745	4,927	26,788	251	662
Maryland	83,412	47,045	23,630	8,281	641	225	3,587
Massachusetts	353,319	13,072	216,120	43,678	70,055	1,955	8,439
Michigan	268,010	64,143	42,013	44,161	89,590	5,276	22,827
Minnesota	160,697	41,364	21,746	8,808	16,698	58,837	13,244
Mississippi	11,191	2,960	3,359	1,547	375	1,241	1,709
Missouri	222,267	113,618	54,983	19,121	8,418	3,204	22,833
Nebraska	30,748	10,954	4,999	4,615	2,635	3,987	3,558
Nevada	18,801	2,181	5,035	3,480	2,365	505	5,235
New Hampshire	29,611	436	12,190	3,598	12,955	108	324
New Jersey	188,943	54,001	86,784	33,128	2,474	1,154	11,402
New York	1,138,353	316,902	528,806	145,210	79,042	8,198	60,195
North Carolina	3,029	904	667	920	171	51	316
Ohio	372,493	182,897	82,674	57,319	12,988	600	36,015
Oregon	11,600	1,875	1,967	1,804	1,187	368	4,399
Pennsylvania	545,309	160,146	235,798	114,144	10,022	2,942	22,257
Rhode Island	55,396	1,201	31,534	11,205	10,242	152	972
South Carolina	8,074	2,754	3,262	942	77	111	928
Tennessee	19,316	4,539	8,048	2,954	587	474	2,714
Texas	62,411	23,985	4,031	2,713	597	926	30,159
Vermont	47,155	370	14,080	3,751	28,544	138	272
Virginia	13,754	4,050	5,191	2,762	327	70	1,354
West Virginia	17,091	6,232	6,832	2,878	207	27	915
Wisconsin	364,499	162,314	48,479	41,832	25,666	48,057	38,651
Arizona	5,809	379	495	191	142	33	4,569
Colorado	6,599	1,456	1,685	1,711	753	297	697
Dakota	4,815	563	888	328	906	1,674	456
District of Columbia	16,254	4,920	8,218	1,803	290	56	967
Idaho	7,885	590	986	989	334	240	4,737
Montana	7,979	1,233	1,635	1,097	1,172	324	2,518
New Mexico	5,620	582	543	165	126	26	4,179
Utah	30,702	358	502	20,247	687	7,360	1,548
Washington	5,024	645	1,047	1,144	1,121	347	720
Wyoming	3,513	652	1,102	874	329	191	365
Total	**5,567,229**	**1,690,533**	**1,855,827**	**766,292**	**493,464**	**241,685**	**519,428**

TABLE 8.—*The special nativity of the foreign-born population in* 1880.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Number of foreign-born inhabitants born in—						
	All foreign countries.	German Empire.	Ireland.	Great Britain. *	British America.	Sweden, Norway, and Denmark. *	Other countries. *
Alabama	9,734	3,238	2,966	1,441	271	212	1,606
Arkansas	10,350	3,620	2,432	1,505	787	342	1,664
California	292,874	42,532	62,962	33,097	18,889	9,722	125,672
Colorado	39,790	7,012	8,263	11,684	5,785	3,033	4,013
Connecticut	129,992	15,627	70,638	20,045	16,444	2,682	4,556
Delaware	9,468	1,179	5,791	1,770	246	113	369
Florida	9,909	978	652	1,113	446	569	6,151
Georgia	10,564	2,956	4,148	1,612	348	214	1,286
Illinois	583,576	235,786	117,343	75,859	34,043	65,414	55,131
Indiana	144,178	80,756	25,741	14,767	6,569	3,886	13,459
Iowa	261,650	88,268	44,061	32,526	21,097	46,046	29,652
Kansas	110,086	28,034	14,993	20,059	12,536	14,403	20,061
Kentucky	59,517	30,413	18,256	5,481	1,070	189	4,108
Louisiana	54,146	17,475	13,807	3,320	720	633	18,185
Maine	58,883	688	13,421	5,401	37,114	1,360	899
Maryland	82,806	45,481	21,865	8,813	968	413	5,246
Massachusetts	443,491	16,872	226,700	60,732	119,302	5,971	13,914
Michigan	388,508	89,085	43,413	54,827	118,866	16,445	35,872
Minnesota	267,676	66,592	25,942	12,609	29,631	107,768	25,134
Mississippi	9,209	2,556	2,753	1,367	309	457	1,767
Missouri	211,578	106,800	48,898	21,249	8,685	4,517	21,429
Nebraska	97,414	31,125	10,133	11,060	8,622	16,685	19,769
Nevada	25,653	2,213	5,191	5,147	3,147	786	9,169
New Hampshire	46,294	789	13,052	4,631	27,142	210	440
New Jersey	221,700	64,935	93,079	39,803	3,536	3,115	17,232
New York	1,211,379	355,913	499,445	151,914	84,182	16,494	103,431
North Carolina	3,742	950	611	1,163	425	92	501
Ohio	394,943	192,597	78,927	64,340	16,146	2,006	40,927
Oregon	30,503	5,034	3,659	4,254	3,019	1,942	12,595
Pennsylvania	587,829	168,426	236,505	130,360	12,376	8,901	31,261
Rhode Island	73,993	1,966	35,281	15,709	18,306	867	1,814
South Carolina	7,686	2,846	2,626	1,038	141	128	907
Tennessee	16,702	3,983	5,975	2,792	545	374	3,033
Texas	114,616	35,347	8,103	8,434	2,472	2,662	57,598
Vermont	40,959	396	11,657	3,777	24,620	113	396
Virginia	14,696	3,759	4,835	3,815	585	138	1,564
West Virginia	18,265	7,029	6,459	3,044	295	62	1,376
Wisconsin	405,425	184,328	41,907	36,150	28,965	66,284	47,791
Arizona	16,049	1,110	1,296	1,016	571	282	11,774
Dakota	51,795	5,925	4,104	3,456	10,678	17,869	9,763
District of Columbia	17,122	5,655	7,840	2,200	452	115	1,460
Idaho	9,974	750	981	2,497	584	1,185	3,977
Montana	11,521	1,705	2,408	1,821	2,481	644	2,462
New Mexico	8,051	729	795	477	280	79	5,691
Utah	43,994	885	1,321	25,258	1,036	12,755	2,739
Washington	15,803	2,198	2,243	2,478	2,857	1,524	4,503
Wyoming	5,850	801	1,093	1,667	542	511	1,236
Total	**6,679,943**	**1,966,742**	**1,854,571**	**917,598**	**717,157**	**440,262**	**783,613**

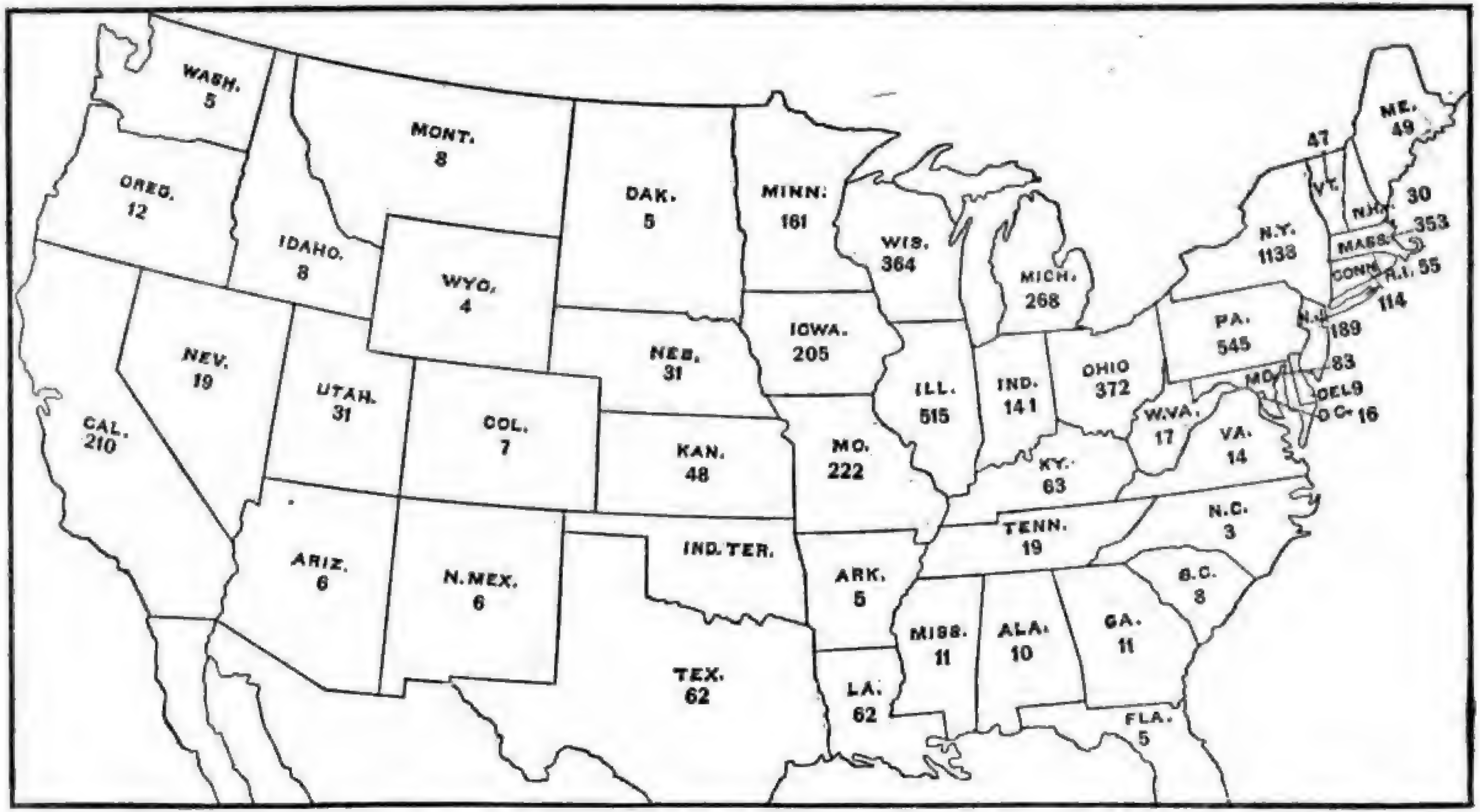


DIAGRAM No. 23.—Number, in thousands, of foreign-born inhabitants, 1870.

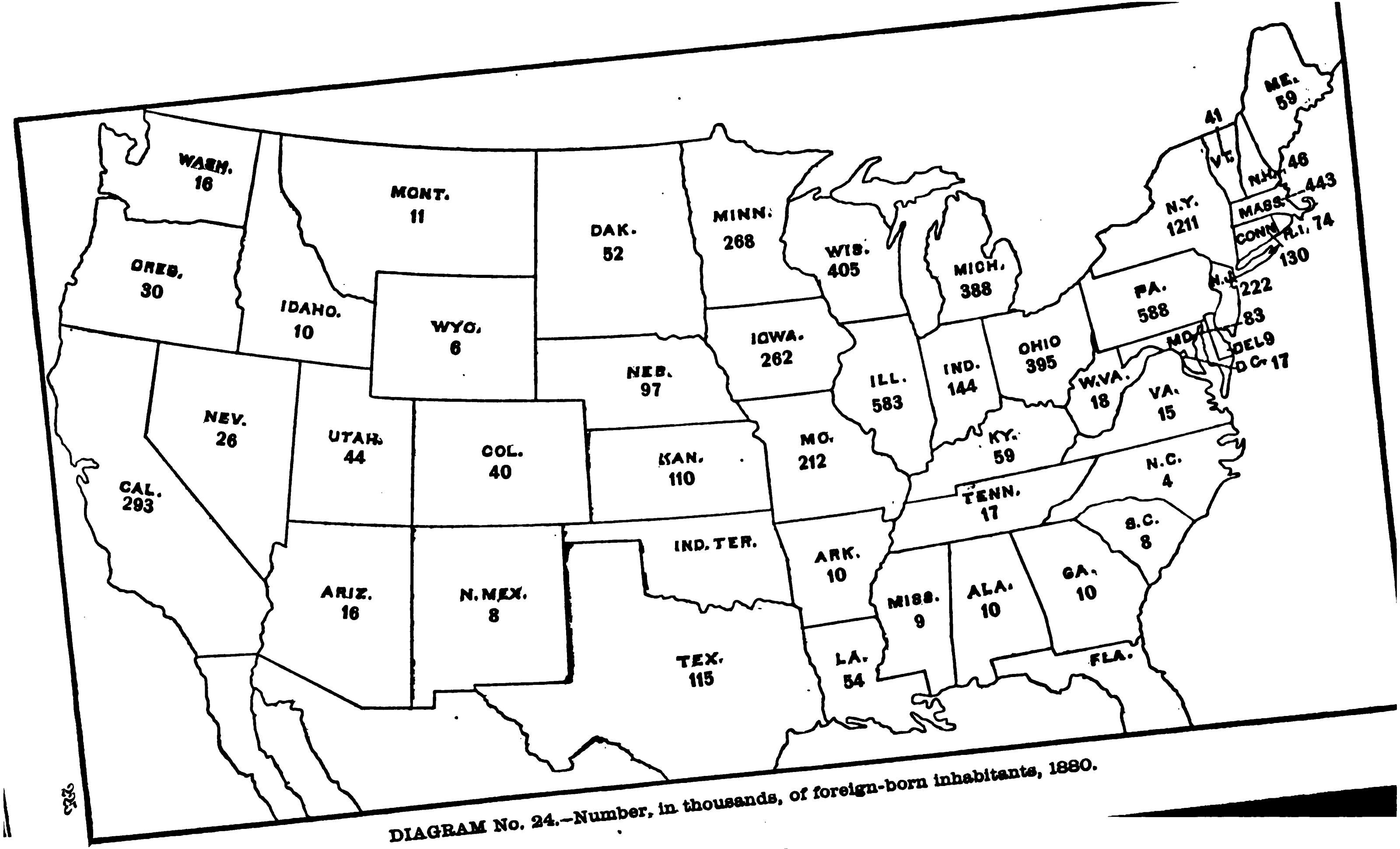


DIAGRAM No. 24.—Number, in thousands, of foreign-born inhabitants, 1880.

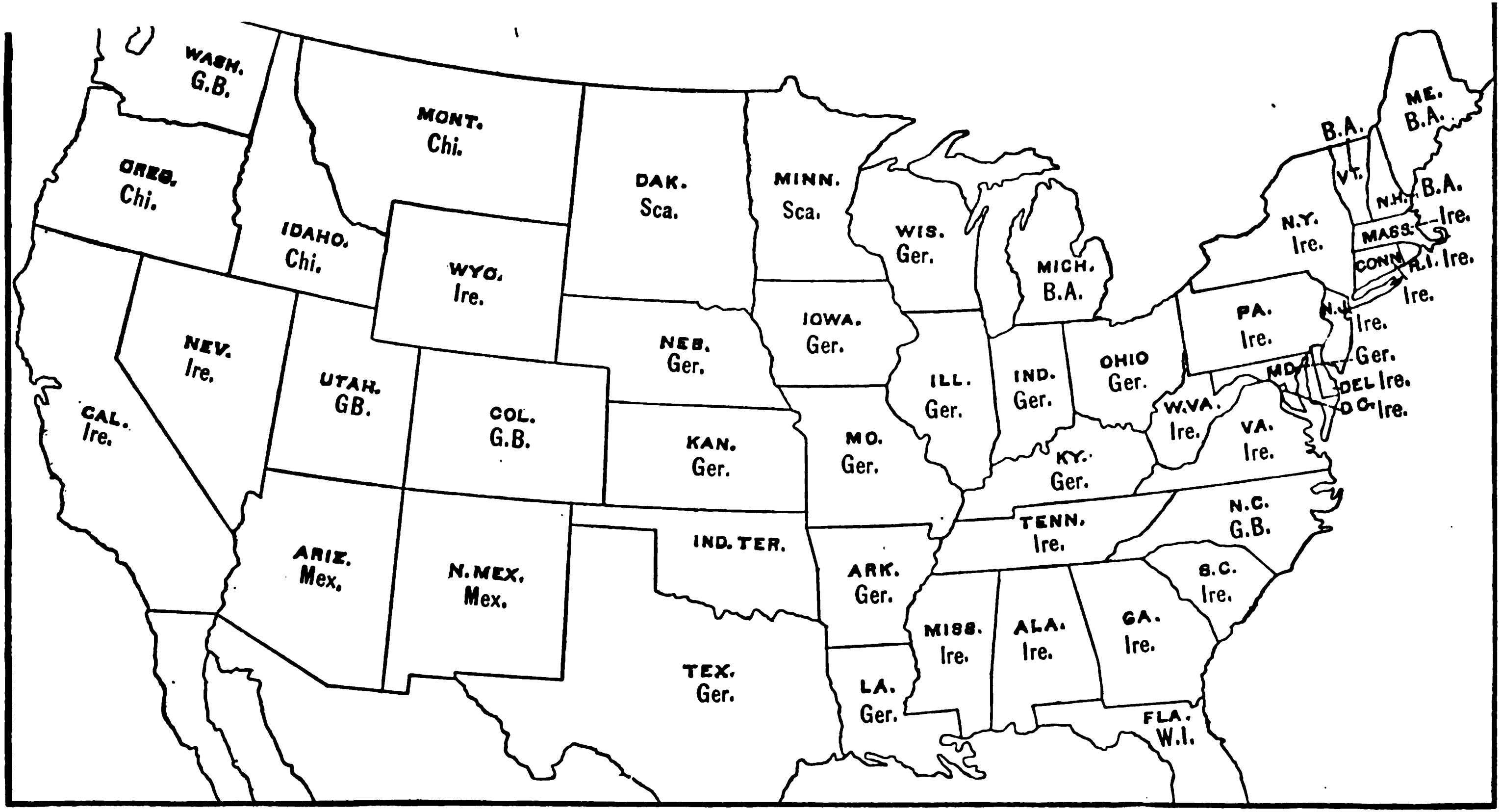


DIAGRAM No. 25.—Nationality of most numerous foreign-born inhabitants, 1870.

B. A.—British Americans.
Chi.—Chinese.
G. B.—English, Scotch, and Welsh.
Ger.—Germans.
Sca.—Swedes, Norwegians, and Danes.
Ire.—Irish.
Mex.—Mexicans.
W. I.—West Indians.

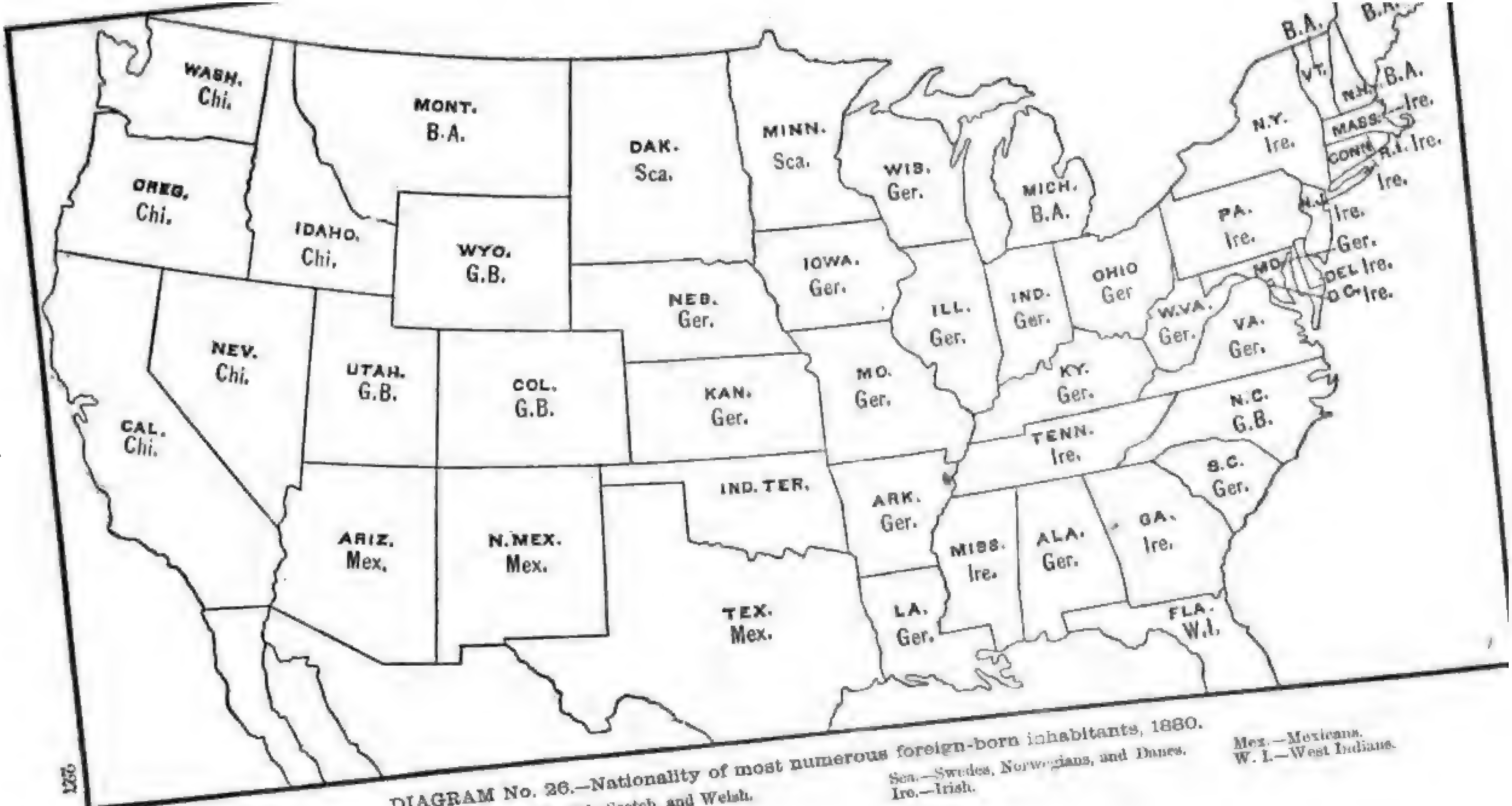


DIAGRAM No. 26.—Nationality of most numerous foreign-born inhabitants, 1880.

B. A.—British Americans.
G. B.—English, Scotch, and Welsh.
Ger.—Germans.
Sca.—Swedes, Norwegians, and Danes.
Ire.—Irish.
Mex.—Mexicans.
W. I.—West Indians.

TABLE 9.—*The number of minors in 1870 for each of the first five years of life in each State and Territory.*

States and Territories.	Under 1.	1.	2.	3.	4.
Alabama	30, 370	31, 107	33, 084	30, 637	31, 266
Arizona	178	155	122	142	152
Arkansas	17, 035	16, 763	17, 407	15, 689	15, 270
California	13, 490	13, 389	13, 981	13, 766	13, 651
Colorado	1, 063	1, 184	1, 137	1, 170	981
Connecticut	12, 000	11, 165	12, 069	11, 934	11, 467
Dakota	423	419	432	400	377
Delaware	3, 444	3, 211	3, 453	3, 328	3, 277
District of Columbia	3, 779	3, 620	3, 524	3, 525	3, 330
Florida	5, 378	5, 806	6, 471	6, 049	6, 788
Georgia	36, 892	38, 098	39, 527	37, 142	37, 749
Idaho	221	176	239	216	223
Illinois	79, 330	77, 127	80, 605	78, 969	74, 742
Indiana	51, 061	49, 496	52, 416	52, 304	48, 029
Iowa	38, 975	37, 440	39, 084	38, 335	36, 867
Kansas	12, 935	11, 746	11, 881	11, 755	11, 129
Kentucky	42, 020	40, 129	42, 517	41, 980	40, 344
Louisiana	22, 106	20, 141	23, 439	23, 024	21, 862
Maine	13, 044	12, 809	14, 122	14, 206	13, 535
Maryland	22, 086	20, 472	22, 298	21, 783	21, 828
Massachusetts	32, 987	30, 026	32, 333	32, 087	29, 506
Michigan	32, 629	32, 003	34, 160	33, 875	31, 535
Minnesota	13, 937	13, 839	14, 457	14, 750	13, 998
Mississippi	27, 950	25, 888	28, 940	27, 170	27, 346
Missouri	54, 250	54, 498	57, 276	56, 513	53, 825
Montana	314	298	311	304	242
Nebraska	4, 154	3, 874	3, 995	3, 822	3, 663
Nevada	638	596	749	662	652
New Hampshire	5, 740	5, 716	6, 194	6, 071	5, 944
New Jersey	24, 886	22, 705	24, 539	24, 282	23, 211
New Mexico	2, 640	2, 366	2, 674	2, 967	2, 685
New York	103, 878	100, 385	107, 743	105, 721	102, 801
North Carolina	30, 770	33, 242	34, 822	32, 044	32, 393
Ohio	75, 657	71, 602	78, 045	76, 634	73, 414
Oregon	2, 632	2, 723	2, 806	2, 887	2, 700
Pennsylvania	99, 261	96, 286	101, 575	99, 505	95, 714
Rhode Island	4, 920	4, 404	4, 888	4, 689	4, 387
South Carolina	19, 901	22, 161	22, 919	22, 107	22, 234
Tennessee	39, 418	40, 556	41, 984	39, 396	39, 291
Texas	25, 400	28, 379	27, 018	26, 588	27, 252
Utah	3, 545	3, 346	3, 352	3, 129	3, 324
Vermont	7, 128	7, 209	7, 790	7, 884	7, 352
Virginia	35, 802	36, 201	38, 700	37, 081	35, 625
Washington	683	605	768	733	760
West Virginia	14, 354	14, 137	15, 246	14, 736	14, 249
Wisconsin	31, 016	30, 983	31, 976	31, 693	31, 422
Wyoming	156	151	121	116	112
Total	1, 200, 475	1, 078, 803	1, 143, 159	1, 113, 782	1, 078, 514

TABLE 10.—*The number of minors in* 1880, *in each State and Territory, for each year of life.*

Years of age.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Dakota.	Delaware.
Under 1	44, 275	733	31, 656	18, 788	4, 010	12, 879	4, 299	3, 867
1	37, 845	669	25, 744	16, 820	3, 448	11, 350	3, 787	3, 348
2	44, 504	686	29, 416	19, 623	3, 923	13, 083	4, 052	3, 765
3	43, 071	846	27, 834	19, 222	3, 898	12, 575	3, 862	3, 660
4	44, 504	808	27, 800	18, 963	3, 921	12, 975	3, 771	3, 795
5	42, 302	727	28, 072	18, 511	3, 656	12, 936	3, 608	3, 694
6	42, 349	734	27, 727	18, 800	3, 651	12, 942	3, 358	3, 647
7	39, 318	754	25, 480	17, 851	3, 304	12, 617	3, 006	3, 429
8	40, 436	764	25, 041	18, 163	3, 348	12, 372	2, 985	3, 392
9	32, 219	597	21, 879	16, 881	2, 848	11, 659	2, 650	3, 255
10	38, 216	776	24, 120	18, 107	3, 129	12, 295	2, 760	3, 481
11	25, 982	454	18, 263	15, 434	2, 497	11, 192	2, 269	2, 877
12	35, 646	618	22, 003	16, 811	2, 888	12, 525	2, 445	3, 558
13	27, 082	368	17, 478	15, 026	2, 384	11, 504	2, 187	3, 108
14	27, 892	563	16, 084	15, 431	2, 309	11, 946	2, 023	3, 229
15	23, 248	511	13, 030	14, 661	2, 015	11, 046	1, 738	2, 890
16	24, 707	548	13, 865	15, 607	2, 197	11, 222	1, 892	3, 117
17	22, 029	511	13, 033	15, 110	2, 146	11, 256	1, 988	2, 998
18	31, 846	739	18, 357	17, 910	3, 128	12, 832	2, 201	3, 395
19	22, 938	662	14, 917	17, 068	3, 621	12, 534	2, 008	3, 109
20	31, 178	973	17, 575	20, 072	4, 633	13, 093	2, 534	3, 404

Years of age.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.
Under 1	4, 624	8, 913	53, 378	895	87, 859	55, 353	48, 025	32, 547
1	3, 870	7, 433	48, 060	773	75, 595	48, 075	42, 674	27, 525
2	4, 153	9, 190	54, 800	865	86, 011	52, 008	46, 227	30, 427
3	4, 219	8, 851	51, 018	852	82, 806	49, 564	46, 636	30, 676
4	4, 269	9, 461	54, 329	799	84, 043	52, 633	46, 548	30, 529
5	4, 190	8, 811	50, 539	763	81, 450	50, 880	44, 372	29, 680
6	4, 150	9, 116	53, 026	739	82, 576	53, 480	43, 206	29, 382
7	4, 121	7, 968	45, 642	682	76, 671	49, 604	42, 466	27, 731
8	3, 940	8, 393	48, 515	676	78, 003	51, 363	42, 767	27, 496
9	3, 681	6, 707	39, 033	561	73, 462	47, 237	40, 053	25, 806
10	3, 952	8, 184	46, 428	647	79, 220	51, 811	43, 906	26, 950
11	3, 427	5, 390	32, 420	528	69, 022	45, 931	37, 746	23, 545
12	3, 995	7, 515	43, 888	585	77, 473	52, 488	41, 204	25, 535
13	3, 541	5, 832	33, 428	482	68, 679	47, 032	37, 633	22, 944
14	3, 490	6, 054	34, 495	533	68, 557	45, 275	36, 810	21, 460
15	3, 214	4, 800	27, 918	430	60, 481	40, 106	32, 520	17, 853
16	3, 122	5, 282	30, 400	434	64, 228	42, 610	34, 101	18, 913
17	2, 904	4, 393	25, 823	434	63, 751	42, 716	34, 326	18, 704
18	3, 387	6, 335	37, 240	498	73, 967	48, 857	38, 686	21, 189
19	3, 481	4, 768	28, 321	523	66, 710	44, 746	35, 276	19, 651
20	3, 936	6, 487	39, 074	600	70, 955	44, 866	36, 528	19, 682

Table 10.—*The number of minors in 1880, in each State and Territory, &c.*—Continued.

Years of age.	Kentucky.	Louisiana.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.
Under 1	52, 062	30, 946	12, 612	20, 327	37, 567	42, 585	24, 624	40, 754
1	44, 228	25, 315	11, 991	21, 748	33, 051	38, 788	22, 150	33, 046
2	52, 158	32, 868	13, 205	25, 364	36, 424	42, 216	23, 352	41, 205
3	48, 874	30, 749	13, 114	24, 688	35, 969	41, 774	23, 722	40, 041
4	50, 105	31, 185	13, 265	24, 827	36, 256	42, 487	23, 161	40, 170
5	48, 525	28, 739	13, 094	24, 002	36, 554	40, 883	22, 315	39, 804
6	51, 055	29, 062	13, 144	24, 777	35, 380	40, 283	21, 698	39, 607
7	46, 424	28, 138	12, 730	23, 070	34, 624	37, 642	20, 529	36, 061
8	47, 352	29, 063	13, 279	23, 214	32, 948	37, 487	20, 522	36, 780
9	42, 589	23, 801	12, 633	21, 562	32, 080	35, 906	18, 523	29, 681
10	46, 841	27, 955	13, 385	23, 658	33, 873	38, 690	19, 710	35, 074
11	37, 472	18, 820	12, 214	19, 339	30, 338	34, 410	16, 884	28, 800
12	45, 490	25, 794	13, 537	23, 033	33, 393	37, 280	18, 161	32, 340
13	38, 975	20, 931	13, 034	19, 878	31, 043	34, 097	16, 865	25, 372
14	38, 602	19, 386	12, 801	20, 805	32, 378	33, 732	16, 162	25, 358
15	33, 180	16, 806	12, 207	18, 349	30, 817	29, 528	14, 708	21, 140
16	35, 967	16, 817	12, 361	19, 501	31, 825	32, 412	15, 801	22, 345
17	33, 083	14, 661	12, 447	18, 204	31, 804	31, 683	15, 697	18, 380
18	39, 541	19, 635	13, 787	20, 819	30, 620	35, 139	17, 571	26, 640
19	34, 322	16, 368	12, 955	18, 970	36, 463	34, 242	16, 412	19, 840
20	36, 238	21, 309	13, 391	20, 983	39, 453	35, 817	17, 470	20, 233

Years of age.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.
Under 1	65, 120	844	15, 066	1, 311	6, 141	28, 102	3, 597	115, 847
1	54, 909	717	13, 539	1, 130	5, 690	24, 348	2, 354	99, 680
2	65, 253	808	14, 209	1, 318	6, 234	27, 546	3, 440	115, 809
3	63, 237	777	14, 504	1, 278	6, 228	27, 172	3, 520	113, 819
4	62, 314	764	14, 149	1, 260	6, 290	27, 458	3, 238	113, 865
5	62, 346	742	13, 537	1, 215	6, 151	27, 339	3, 265	113, 761
6	63, 729	705	12, 932	1, 172	6, 254	27, 129	3, 175	111, 962
7	58, 848	658	12, 301	981	6, 002	26, 513	3, 093	109, 490
8	59, 266	595	11, 991	1, 049	6, 096	25, 456	3, 266	106, 119
9	55, 037	560	11, 154	886	5, 727	24, 370	2, 651	101, 085
10	60, 005	520	11, 772	903	6, 122	25, 749	3, 332	108, 531
11	50, 583	504	9, 603	828	5, 878	22, 435	2, 222	96, 358
12	57, 706	493	10, 527	706	6, 402	25, 350	3, 268	106, 099
13	50, 772	430	9, 117	759	6, 187	22, 972	2, 345	97, 871
14	49, 093	381	8, 662	704	6, 080	23, 909	2, 408	101, 749
15	42, 542	331	7, 358	684	5, 980	21, 309	2, 506	90, 739
16	46, 809	380	7, 982	693	6, 061	22, 252	2, 416	97, 088
17	43, 954	386	7, 672	614	6, 180	21, 627	1, 028	96, 460
18	52, 571	534	9, 087	905	7, 098	23, 879	2, 816	100, 959
19	46, 977	533	8, 786	916	6, 736	22, 517	1, 904	102, 092
20	49, 410	794	8, 867	1, 199	7, 310	23, 926	3, 175	108, 675

Table 10.—*The number of minors in* 1880, *in each State and Territory, &c.*—Continued.

Years of age.	North Carolina.	Ohio.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	Tennessee.	Texas.
Under 1	47,893	84,137	4,777	115,804	6,132	34,985	53,591	60,568
1	44,468	79,554	4,194	103,122	5,402	32,038	46,662	48,945
2	48,520	82,738	4,690	112,510	5,914	36,299	51,802	58,871
3	45,685	81,269	4,770	100,873	5,524	34,031	48,411	55,071
4	46,551	83,729	4,476	110,805	5,613	36,108	49,527	56,570
5	43,395	80,212	4,462	108,223	5,904	33,320	46,861	53,897
6	46,130	82,620	4,462	111,572	5,550	34,629	50,594	52,142
7	40,572	77,850	4,173	105,631	5,586	30,127	45,902	46,778
8	41,062	78,958	4,229	103,519	5,241	31,591	45,913	53,109
9	35,523	73,618	3,961	98,555	5,204	24,903	40,866	41,614
10	39,441	78,584	4,155	104,309	5,422	30,639	44,920	46,464
11	29,914	69,928	3,644	90,565	4,953	19,732	35,340	35,391
12	38,227	77,705	3,975	101,235	5,488	28,618	*43,509	40,933
13	31,032	70,928	3,553	92,053	5,167	21,280	36,075	34,025
14	29,676	70,238	3,657	91,928	5,088	21,903	35,240	33,961
15	25,405	61,390	3,100	82,439	4,720	18,848	29,128	26,070
16	26,570	64,415	3,515	85,121	4,866	19,385	31,480	27,505
17	25,217	64,703	3,043	84,624	4,946	15,629	29,773	26,986
18	34,404	73,786	3,825	92,596	5,710	22,735	37,511	36,506
19	27,071	68,634	3,505	87,248	5,534	16,996	30,112	29,710
20	32,263	69,490	3,957	90,372	5,815	25,025	34,790	36,727

Years of age.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	The Union.
Under 1	5,551	6,760	48,801	2,143	21,131	37,644	533	1,447,983
1	5,009	6,379	43,146	1,969	18,831	32,996	452	1,256,915
2	5,290	7,001	48,493	2,107	20,422	37,434	403	1,427,080
3	4,837	6,917	47,366	2,051	19,515	36,248	501	1,381,274
4	4,904	7,034	46,661	2,010	19,411	37,071	465	1,401,217
5	4,549	6,928	46,863	1,972	18,400	35,725	436	1,357,706
6	4,538	6,987	46,254	1,851	19,475	35,005	402	1,374,678
7	4,037	6,790	42,872	1,797	17,836	33,066	381	1,231,392
8	4,242	6,855	44,387	1,856	18,148	33,430	337	1,295,094
9	3,812	6,583	38,468	1,610	16,695	31,266	320	1,170,590
10	4,001	6,957	44,302	1,757	17,793	33,720	307	1,282,253
11	3,374	6,484	32,466	1,440	14,801	29,545	245	1,056,657
12	3,695	6,875	42,284	1,648	17,115	31,721	248	1,232,940
13	3,107	6,601	33,800	1,372	14,971	29,352	212	1,072,583
14	3,501	6,466	33,705	1,400	14,729	29,209	233	1,070,444
15	3,112	6,075	29,130	1,237	11,977	26,518	176	934,297
16	3,043	6,199	29,890	1,321	12,154	28,721	230	987,508
17	2,872	6,270	25,553	1,160	12,208	28,600	218	949,026
18	2,837	6,790	33,496	1,383	13,750	31,294	329	1,131,132
19	2,804	6,403	28,241	1,337	12,801	27,970	354	1,009,362
20	2,969	6,598	32,791	1,498	12,558	28,984	513	1,113,569

TABLE 11.—*The number of minors in 1870 between specified ages, in each State and Territory.*

[Column marked with an * was computed in the United States Bureau of Education.]

States and Territories.	Under 5.	5–9.	10–14.	15–17.	18–19.	15–19. *	20.
Alabama	150,464	133,726	139,767	69,483	44,641	114,124	26,537
Arizona	749	672	614	335	235	570	328
Arkansas	82,164	60,570	68,288	36,634	22,479	59,113	13,366
California	68,277	61,526	51,785	23,818	16,225	40,043	11,243
Colorado	5,485	4,030	3,364	1,563	1,317	2,880	817
Connecticut	58,635	52,923	55,101	30,938	20,448	51,386	11,096
Dakota	2,051	1,490	1,300	577	438	1,015	256
Delaware	16,713	15,716	15,872	8,219	5,234	13,453	2,784
District of Columbia	17,778	13,469	14,336	7,764	5,246	13,010	2,822
Florida	30,492	26,137	25,504	12,256	8,346	20,602	5,391
Georgia	189,408	158,772	165,986	82,758	52,500	135,258	30,953
Idaho	1,075	735	600	360	273	633	330
Illinois	390,803	339,482	322,130	157,145	103,833	260,978	54,920
Indiana	253,306	229,395	223,467	114,313	73,306	187,619	35,519
Iowa	190,701	165,360	155,063	74,273	48,399	122,672	24,475
Kansas	59,446	46,902	41,753	20,055	13,543	33,598	7,375
Kentucky	206,990	183,885	179,300	91,354	56,136	147,490	27,963
Louisiana	110,572	89,951	90,694	45,469	28,804	74,273	17,096
Maine	67,707	65,361	70,095	40,132	26,662	66,794	13,067
Maryland	108,467	96,988	96,479	50,987	32,867	83,854	17,030
Massachusetts	156,889	139,796	148,371	83,653	58,531	142,184	32,176
Michigan	164,202	146,094	140,495	71,941	47,368	119,309	25,205
Minnesota	70,981	63,157	55,191	24,317	15,248	39,565	8,581
Mississippi	137,303	109,413	112,808	56,778	36,316	93,094	22,404
Missouri	276,362	239,365	227,627	110,811	70,236	181,047	36,940
Montana	1,469	956	769	376	337	713	354
Nebraska	19,508	15,220	13,141	6,162	4,267	10,429	2,535
Nevada	3,297	2,539	1,892	906	916	1,822	697
New Hampshire	29,665	28,209	31,868	18,689	12,889	31,578	6,809
New Jersey	119,623	105,786	103,804	53,272	35,342	88,614	18,755
New Mexico	13,322	12,088	11,446	5,778	4,182	9,960	2,273
New York	520,528	483,272	483,673	264,043	169,821	433,864	105,624
North Carolina	163,271	138,461	147,015	74,454	48,430	122,884	27,282
Ohio	375,412	336,474	334,399	175,098	113,669	288,767	56,674
Oregon	13,808	12,430	11,469	5,501	3,121	8,622	1,654
Pennsylvania	492,341	431,801	422,545	221,694	146,657	368,351	73,140
Rhode Island	23,228	20,314	22,565	12,896	8,952	21,848	4,972
South Carolina	109,322	92,521	94,561	46,833	30,478	77,311	19,832
Tennessee	200,595	167,053	173,708	88,771	54,921	143,692	30,417
Texas	134,687	112,867	115,832	56,152	34,382	90,534	20,251
Utah	16,606	13,575	11,620	5,221	2,951	8,172	1,511
Vermont	37,363	34,437	34,046	20,448	13,276	33,724	7,004
Virginia	183,469	151,638	162,436	82,738	51,006	133,744	27,122
Washington	3,609	3,012	2,385	1,061	602	1,663	411
West Virginia	72,722	60,868	59,822	30,154	18,584	48,738	8,966
Wisconsin	157,690	145,676	139,956	68,184	42,392	110,576	20,985
Wyoming	658	401	278	177	241	418	207
Total	5,514,713	4,814,713	4,786,189	2,454,541	1,586,047	4,040,588	866,169

TABLE 12.—*The number of minors in 1880 between specified ages, in each State and Territory.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Under 5.	5–9.	10–14.	15–17. *	18–19. *	15–19.	20.
Alabama	214, 199	196, 526	154, 818	69, 984	54, 784	124, 768	31, 178
Arizona	3, 942	3, 576	2, 778	1, 570	1, 401	2, 971	973
Arkansas	142, 450	128, 199	97, 948	39, 928	33, 274	73, 202	17, 575
California	98, 426	90, 206	80, 809	45, 378	34, 978	80, 356	20, 072
Colorado	19, 300	16, 807	13, 207	6, 358	6, 749	13, 107	4, 633
Connecticut	62, 871	62, 526	59, 462	33, 524	25, 366	58, 890	13, 033
Dakota	19, 721	15, 607	11, 684	5, 618	4, 299	9, 917	2, 534
Delaware	18, 335	17, 417	16, 253	9, 005	6, 504	15, 509	3, 404
District of Columbia	20, 635	20, 082	18, 405	9, 240	6, 868	16, 108	3, 926
Florida	43, 848	40, 995	32, 975	14, 475	11, 103	25, 578	6, 487
Georgia	261, 585	236, 755	190, 659	84, 141	65, 561	149, 702	39, 074
Idaho	4, 184	3, 421	2, 775	1, 298	1, 021	2, 319	600
Illinois	416, 314	392, 242	362, 951	188, 460	140, 677	329, 137	70, 955
Indiana	257, 633	252, 573	242, 537	125, 402	93, 603	219, 005	44, 866
Iowa	230, 110	212, 864	196, 290	100, 947	73, 962	174, 909	36, 528
Kansas	151, 704	140, 095	120, 464	55, 470	40, 840	96, 310	19, 682
Kentucky	248, 347	236, 845	207, 380	102, 230	73, 863	176, 093	36, 238
Louisiana	151, 083	139, 793	111, 986	48, 374	36, 003	84, 377	21, 368
Maine	64, 387	64, 880	64, 971	37, 005	26, 742	63, 747	13, 331
Maryland	122, 954	116, 625	106, 733	56, 054	39, 789	95, 843	20, 988
Massachusetts	179, 307	171, 595	161, 425	94, 506	73, 089	167, 595	39, 458
Michigan	207, 850	192, 401	178, 858	93, 623	69, 381	163, 004	35, 317
Minnesota	117, 209	103, 587	87, 782	46, 206	33, 983	80, 189	17, 470
Mississippi	195, 876	182, 028	142, 043	62, 065	46, 486	108, 551	26, 233
Missouri	310, 923	299, 826	268, 819	132, 865	99, 548	232, 413	49, 410
Montana	3, 910	3, 260	2, 328	1, 108	1, 067	2, 175	794
Nebraska	72, 156	61, 975	49, 971	23, 212	17, 873	41, 085	8, 867
Nevada	6, 297	5, 303	4, 050	1, 991	1, 821	3, 812	1, 199
New Hampshire	30, 573	30, 230	30, 669	18, 221	13, 834	32, 055	7, 310
New Jersey	134, 716	130, 809	120, 424	65, 188	46, 396	111, 584	23, 926
New Mexico	16, 149	15, 450	13, 635	6, 610	4, 720	11, 330	3, 175
New York	559, 030	542, 423	510, 608	284, 887	209, 051	493, 938	108, 675
North Carolina	233, 117	206, 682	168, 290	77, 192	61, 475	138, 667	32, 263
Ohio	405, 427	393, 268	367, 433	190, 577	142, 420	332, 997	69, 490
Oregon	22, 916	21, 287	18, 984	9, 757	7, 390	17, 147	3, 957
Pennsylvania	552, 174	527, 502	480, 700	252, 184	179, 844	432, 028	90, 372
Rhode Island	28, 585	27, 485	26, 118	14, 541	11, 244	25, 785	5, 615
South Carolina	173, 551	154, 570	122, 181	53, 872	39, 731	93, 603	25, 025
Tennessee	249, 993	230, 236	195, 084	90, 381	67, 623	158, 004	34, 790
Texas	280, 023	247, 530	190, 774	80, 621	66, 222	146, 843	36, 727
Utah	25, 591	21, 178	17, 858	9, 027	5, 701	14, 728	2, 969
Vermont	34, 091	34, 143	33, 583	18, 544	13, 193	31, 737	6, 596
Virginia	224, 087	218, 844	187, 157	84, 573	61, 737	146, 310	32, 731
Washington	10, 310	9, 086	7, 617	3, 718	2, 720	6, 438	1, 498
West Virginia	99, 310	90, 560	79, 409	36, 429	26, 611	63, 040	12, 558
Wisconsin	181, 298	168, 492	153, 547	83, 839	59, 264	143, 103	28, 984
Wyoming	2, 434	1, 876	1, 245	633	683	1, 316	513
Total	6, 914, 516	6, 479, 660	5, 715, 186	2, 870, 921	2, 140, 494	5, 011, 415	1, 113, 569

TABLE 13.—*The minor and adult populations in 1870 and 1880 compared.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Population 1870.		Population 1880.		Per cent. to total population.			
					1870.		1880.	
	Minor (under 21).	Adult (21 and over).	Minor (under 21).	Adult (21 and over).	Minor.	Adult.	Minor.	Adult.
		*	*	*	*	*	*	*
Alabama	570,618	426,874	721,489	541,016	57.2	42.8	57.1	42.9
Arizona	2,933	6,725	14,240	26,200	30.3	69.7	30.3	69.7
Arkansas	283,521	200,950	459,374	343,151	58.5	41.5	57.2	42.8
California	232,874	327,373	364,869	499,825	41.6	58.4	42.2	57.8
Colorado	16,576	23,288	67,054	127,273	41.6	58.4	34.5	65.5
Connecticut	229,141	308,313	256,782	365,918	42.7	57.3	41.2	58.8
Dakota	6,112	8,069	59,463	75,714	43.1	56.9	44.0	56.0
Delaware	64,538	60,477	70,918	75,690	51.6	48.4	48.4	51.6
District of Columbia	61,415	70,285	79,166	98,458	46.6	53.4	44.6	55.4
Florida	108,126	79,622	149,883	119,610	57.6	42.4	55.6	44.4
Georgia	680,377	503,732	877,775	664,405	57.5	42.5	56.9	43.1
Idaho	3,378	11,626	13,299	19,311	22.5	77.5	40.8	59.2
Illinois	1,368,322	1,171,569	1,571,599	1,506,272	53.9	46.1	51.1	48.9
Indiana	929,306	751,331	1,016,704	961,597	55.3	44.7	51.4	48.6
Iowa	658,271	535,749	850,710	773,905	55.1	44.9	52.4	47.6
Kansas	189,074	175,325	528,255	467,841	51.9	48.1	53.3	46.7
Kentucky	745,628	575,383	904,903	743,787	56.4	43.6	54.9	45.1
Louisiana	382,585	344,330	508,607	431,339	52.6	47.4	54.1	45.9
Maine	283,024	343,891	271,316	377,620	45.1	54.9	41.8	58.2
Maryland	402,818	378,076	463,138	471,805	51.6	48.4	49.6	50.4
Massachusetts	619,416	837,935	719,375	1,063,710	42.4	57.6	40.3	59.7
Michigan	595,305	588,754	776,939	869,067	50.3	49.7	47.5	52.5
Minnesota	237,475	202,231	406,237	374,536	54.0	46.0	52.3	47.7
Mississippi	475,022	352,900	654,731	476,866	57.4	42.6	57.9	42.1
Missouri	961,341	759,954	1,161,391	1,006,989	55.8	44.2	53.6	46.4
Montana	4,261	16,334	12,467	26,692	20.7	79.3	31.8	68.2
Nebraska	60,833	62,160	234,054	218,348	49.5	50.5	51.7	48.3
Nevada	10,247	32,244	20,661	41,605	24.1	75.9	33.2	66.8
New Hampshire	128,129	190,171	130,837	216,154	40.3	59.7	37.7	62.3
New Jersey	436,582	469,514	521,459	609,657	47.1	52.9	46.1	53.9
New Mexico	49,089	42,785	59,739	59,826	53.4	46.6	50.0	50.0
New York	2,026,961	2,355,798	2,214,664	2,868,207	46.2	53.8	43.6	56.4
North Carolina	598,913	472,448	779,919	620,731	55.9	44.1	55.7	44.3
Ohio	1,391,726	1,273,534	1,568,615	1,629,447	52.2	47.8	49.1	50.9
Oregon	47,983	42,940	84,291	90,477	52.8	47.2	48.2	51.8
Pennsylvania	1,788,178	1,733,773	2,082,776	2,200,115	50.8	49.2	48.6	51.4
Rhode Island	92,987	124,366	113,788	162,743	42.8	57.2	41.1	58.9
South Carolina	393,547	312,059	568,930	426,647	55.8	44.2	57.1	42.9
Tennessee	715,525	542,995	868,107	674,252	56.9	43.1	56.3	43.7
Texas	474,121	344,458	901,897	689,852	57.9	42.1	56.7	43.3
Utah	51,574	35,212	82,324	61,639	59.4	40.6	57.2	42.8
Vermont	147,474	183,677	140,152	192,134	44.6	55.4	42.2	57.8
Virginia	658,409	566,754	819,729	692,836	53.7	46.3	54.2	45.8
Washington	11,080	12,875	34,949	40,167	46.3	53.7	46.5	53.5
West Virginia	251,116	190,898	344,877	273,580	56.8	43.2	55.8	44.2
Wisconsin	574,483	480,187	675,419	640,078	54.5	45.5	51.3	48.7
Wyoming	1,962	7,156	7,384	13,405	21.5	78.5	35.5	64.5
Total	20,022,871	18,536,000	25,234,346	24,921,437	51.9	48.1	50.3	49.7

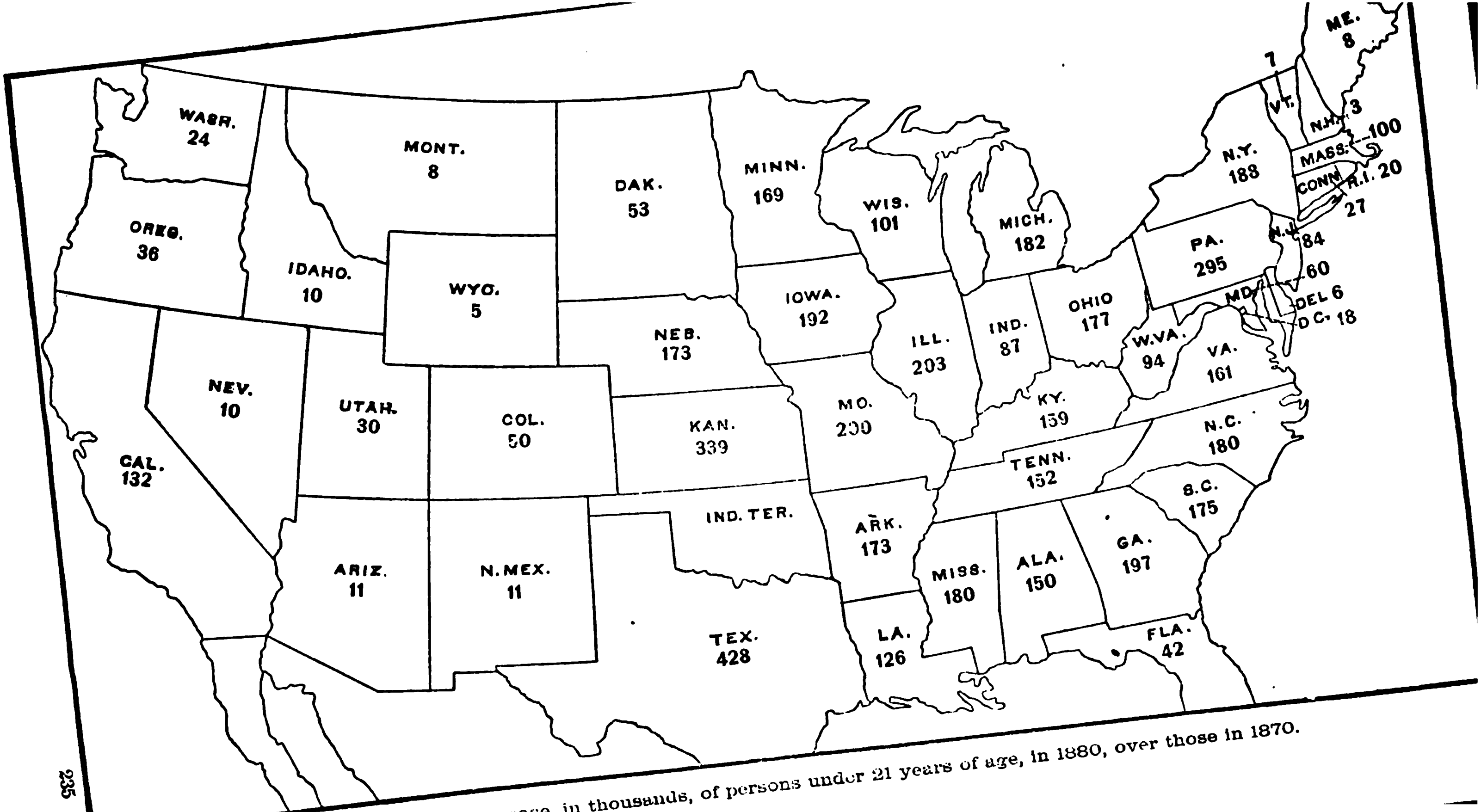


DIAGRAM No. 27.—Increase, in thousands, of persons under 21 years of age, in 1880, over those in 1870.

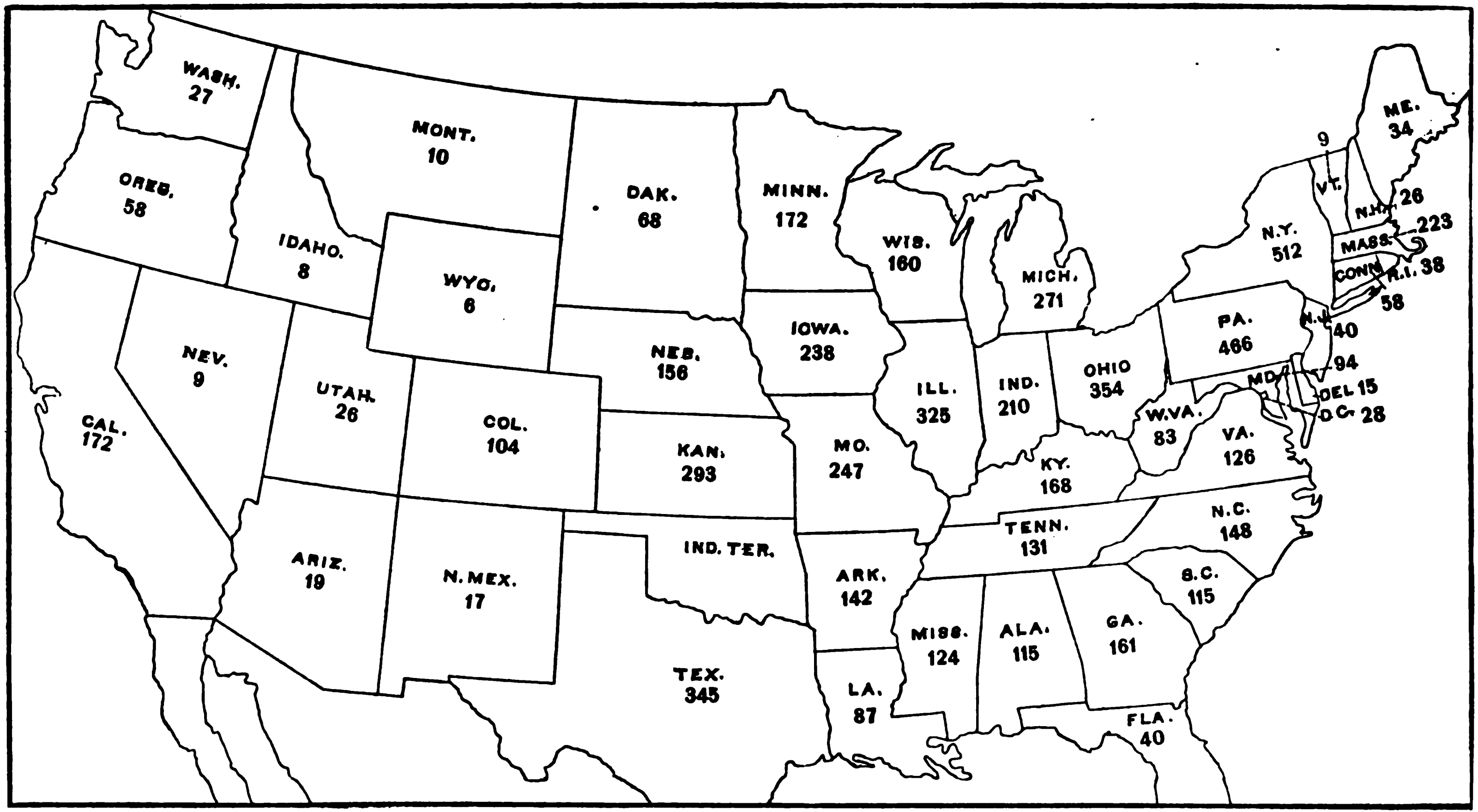


DIAGRAM No. 28.—Increase, in thousands, of persons 21 or more years old, in 1880, over those in 1870.

TABLE 14.—*The number, in 1880, of minors of legal school age, the number between 6 and 15 years old, the numbers older and younger than those ages, and the difference in number between the school population and the population between 6 and 15.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Under legal school age.	Of legal school age.	Over legal school age.	Under 6 years old.	Between 6 and 15.	16 years old and over.	Surplus of school population over number between 6 and 15 years.
	*	*	*	*	*	*	*
Alabama	298, 750	422, 739	....	256, 501	332, 290	132, 698	90, 440
Arkansas	170, 522	288, 852	....	170, 522	211, 105	77, 747	77, 747
California	93, 426	201, 283	70, 160	111, 937	167, 165	85, 767	34, 118
Colorado	22, 956	44, 098	....	22, 956	28, 373	15, 725	15, 725
Connecticut	49, 896	146, 009	60, 877	75, 807	120, 098	60, 877	25, 911
Delaware	22, 029	48, 889	....	22, 029	32, 866	16, 023	16, 023
Florida	34, 387	115, 496	....	52, 659	69, 959	27, 265	45, 537
Georgia	312, 124	461, 016	104, 635	312, 124	404, 793	160, 858	56, 223
Illinois	497, 764	1, 073, 835	....	497, 764	734, 224	339, 611	339, 611
Indiana	308, 522	708, 182	....	308, 522	484, 387	223, 795	223, 795
Iowa	230, 110	620, 600	....	274, 482	397, 311	178, 917	223, 289
Kansas	151, 704	376, 551	....	181, 384	248, 732	98, 139	127, 819
Kentucky	296, 872	548, 522	59, 509	296, 872	428, 880	179, 151	119, 642
Louisiana	179, 822	271, 414	57, 371	179, 822	239, 936	88, 849	31, 478
Maine	51, 122	220, 194	....	77, 481	128, 964	64, 871	91, 230
Maryland	122, 954	319, 201	20, 983	146, 956	217, 705	98, 477	101, 496
Massachusetts	179, 307	333, 020	207, 048	215, 801	327, 283	176, 231	5, 737
Michigan	207, 850	533, 763	35, 317	248, 733	359, 404	168, 793	174, 359
Minnesota	117, 209	289, 028	....	139, 524	183, 762	82, 951	105, 266
Mississippi	195, 876	458, 855	....	235, 709	305, 318	113, 644	153, 537
Missouri	373, 269	738, 712	49, 410	373, 269	548, 841	239, 281	189, 871
Nebraska	72, 156	161, 898	....	85, 693	105, 767	42, 594	56, 131
Nevada	7, 512	10, 129	3, 020	7, 512	8, 822	4, 327	1, 307
New Hampshire	30, 573	60, 899	39, 365	36, 724	60, 728	33, 385	171
New Jersey	134, 716	316, 421	70, 322	162, 955	245, 203	114, 201	71, 218
New York	550, 020	1, 655, 644	....	672, 781	1, 030, 009	511, 874	625, 635
North Carolina	276, 512	502, 507	....	276, 512	356, 982	145, 525	145, 525
Ohio	485, 639	1, 082, 976	....	485, 639	741, 888	341, 088	341, 088
Oregon	18, 440	61, 894	3, 957	27, 378	39, 008	17, 905	22, 886
Pennsylvania	660, 399	1, 422, 377	....	660, 399	982, 416	439, 961	439, 961
Rhode Island	28, 585	58, 332	26, 871	34, 489	52, 428	26, 871	5, 904
South Carolina	206, 871	262, 279	99, 780	206, 871	262, 279	99, 780	....
Tennessee	296, 854	571, 253	....	296, 854	407, 587	163, 666	163, 666
Texas	432, 830	251, 536	217, 531	333, 910	410, 487	157, 500	a—158, 951
Vermont	34, 091	99, 463	6, 598	41, 019	66, 873	32, 260	32, 590
Virginia	234, 687	585, 042	....	281, 550	388, 268	149, 911	196, 774
West Virginia	117, 716	227, 161	....	117, 716	163, 540	63, 621	63, 621
Wisconsin	144, 222	502, 213	28, 984	217, 018	312, 832	145, 569	189, 381
Total	7, 657, 294	16, 052, 283	1, 161, 738	8, 145, 094	11, 606, 513	5, 119, 708	4, 445, 770
Arizona	4, 669	9, 571	....	4, 669	6, 138	3, 433	3, 433
Dakota	19, 721	39, 742	....	23, 329	25, 421	10, 713	14, 321
District of Columbia	24, 825	43, 537	10, 804	24, 825	37, 511	16, 830	6, 026
Idaho	4, 184	9, 115	....	4, 947	5, 863	2, 489	3, 252
Montana	3, 146	9, 321	....	4, 652	5, 177	2, 638	4, 144
New Mexico	22, 589	29, 255	7, 895	19, 414	28, 386	11, 939	869
Utah	30, 140	43, 514	8, 670	30, 140	37, 599	14, 585	5, 915
Washington	10, 310	24, 639	....	12, 282	15, 968	6, 699	8, 671
Wyoming	3, 272	4, 112	....	2, 870	2, 861	1, 653	1, 251
Total	122, 856	212, 806	27, 369	127, 128	164, 924	70, 979	47, 882
Grand total	7, 780, 150	16, 265, 089	1, 189, 107	8, 272, 222	11, 771, 437	5, 190, 687	4, 493, 652

a In Texas the school population was less than the number between 6 and 15.

TABLE 15.—*The number, nativity, and race of the minor males in the school population in each State and Territory in 1880.*

States and Territories.	Native white males.	Foreign white males.	Total white males.	Colored males.*a*	Total males.
Alabama	107,019	387	107,406	103,639	211,045
Arkansas	107,490	631	108,121	38,040	146,161
California	92,488	4,568	97,056	4,810	101,866
Colorado	21,282	2,112	23,394	441	23,835
Connecticut	68,019	4,374	72,393	1,227	73,620
Delaware	19,661	356	20,017	4,718	24,735
Florida	29,190	682	29,872	27,560	57,432
Georgia	116,449	195	116,644	116,951	233,595
Illinois	492,934	37,227	530,161	7,572	537,733
Indiana	343,236	6,092	349,328	6,572	355,900
Iowa	292,998	19,574	312,572	1,841	314,413
Kansas	174,434	10,682	185,116	8,666	193,782
Kentucky	239,988	1,844	241,832	35,394	277,226
Louisiana	63,771	704	64,475	71,045	135,520
Maine	104,029	6,448	110,477	338	110,815
Maryland	119,877	2,714	122,591	36,578	159,169
Massachusetts	152,190	13,220	165,410	1,632	167,042
Michigan	253,446	13,682	267,128	3,718	270,846
Minnesota	119,786	25,719	145,505	684	146,189
Mississippi	93,956	339	94,295	135,032	229,327
Missouri	340,337	7,808	348,145	24,914	373,059
Nebraska	72,243	10,960	83,203	411	83,614
Nevada	4,210	357	4,567	507	5,074
New Hampshire	28,082	2,567	30,649	71	30,720
New Jersey	145,445	7,761	153,206	4,967	158,173
New York	749,229	55,986	805,215	8,741	813,956
North Carolina	151,471	258	151,729	101,695	253,424
Ohio	508,760	18,772	527,532	13,252	540,784
Oregon	29,475	925	30,400	1,716	32,116
Pennsylvania	664,849	31,414	696,263	11,546	707,809
Rhode Island	24,963	3,555	28,518	612	29,130
South Carolina	48,110	114	48,224	84,779	133,003
Tennessee	209,794	678	210,472	76,835	287,307
Texas	90,272	3,915	94,187	34,590	128,777
Vermont	47,293	3,038	50,331	189	50,520
Virginia	163,477	753	164,230	128,464	292,694
West Virginia	109,751	683	110,434	4,861	115,295
Wisconsin	225,324	26,192	251,516	1,159	252,675
Total	6,605,328	346,786	6,952,114	1,106,267	8,058,381
Arizona	2,916	1,461	4,377	1,010	5,387
Dakota	14,478	5,856	20,334	330	20,664
District of Columbia	14,207	275	14,482	6,506	20,988
Idaho	4,285	336	4,621	229	4,850
Montana	4,138	313	4,451	571	5,022
New Mexico	13,272	375	13,647	1,308	14,955
Utah	19,659	2,312	21,971	148	22,119
Washington	10,711	633	11,344	1,649	12,993
Wyoming	1,866	284	2,150	136	2,286
Total	85,532	11,845	97,377	11,887	109,264
Grand total	6,690,860	358,631	7,049,491	1,118,154	8,167,645

a Including Oriental and Indian.

TABLE 16.—*The number, nativity, and race of the minor females in the school population of each State and Territory in* 1880.

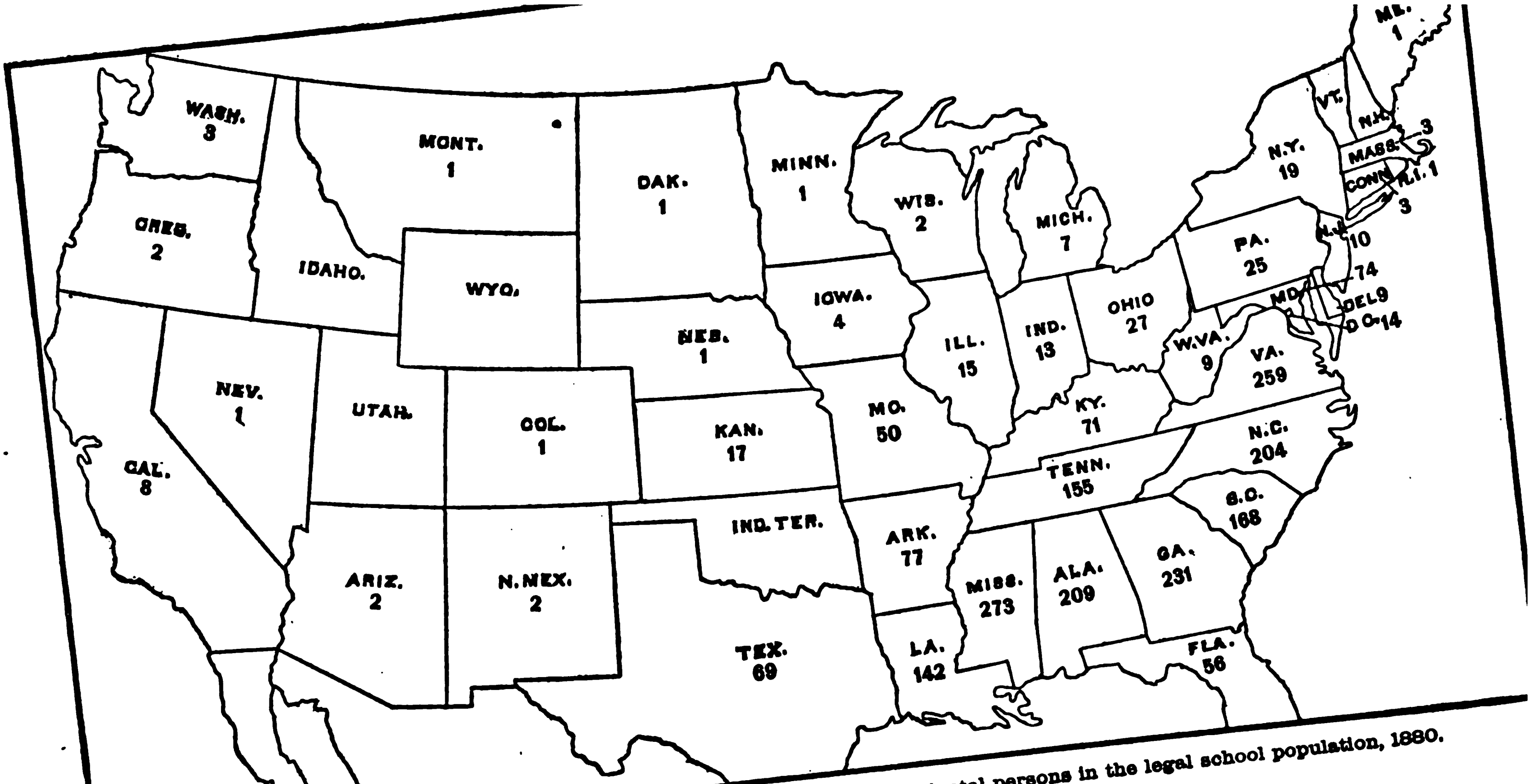
States and Territories.	Native white females.	Foreign white females.	Total white females.	Colored females.[a]	Total females.
Alabama	106, 474	272	106, 746	104, 948	211, 694
Arkansas	103, 401	496	103, 897	38, 794	142, 691
California	91, 821	4, 532	96, 353	3, 064	99, 417
Colorado	18, 428	1, 482	19, 910	353	20, 263
Connecticut	66, 680	4, 380	71, 060	1, 329	72, 389
Delaware	19, 181	423	19, 604	4, 550	24, 154
Florida	28, 395	734	29, 129	28, 935	58, 064
Georgia	113, 043	185	113, 228	114, 193	227, 421
Illinois	491, 042	37, 356	528, 398	7, 704	536, 102
Indiana	339, 380	6, 015	345, 395	6, 887	352, 282
Iowa	286, 576	17, 843	304, 419	1, 768	306, 187
Kansas	164, 433	9, 596	174, 029	8, 740	182, 769
Kentucky	234, 421	1, 462	235, 883	35, 413	271, 296
Louisiana	63, 951	798	64, 749	71, 145	135, 894
Maine	101, 860	7, 188	109, 048	331	109, 379
Maryland	119, 485	2, 933	122, 418	37, 614	160, 032
Massachusetts	150, 689	13, 612	164, 301	1, 677	165, 978
Michigan	227, 136	31, 970	259, 106	3, 811	262, 917
Minnesota	118, 081	24, 071	142, 152	687	142, 839
Mississippi	91, 528	278	91, 806	137, 722	229, 528
Missouri	332, 844	7, 415	340, 259	25, 394	365, 653
Nebraska	67, 834	10, 000	77, 834	450	78, 284
Nevada	4, 357	366	4, 723	332	5, 055
New Hampshire	27, 449	2, 661	30, 110	69	30, 179
New Jersey	144, 931	8, 161	153, 092	5, 156	158, 248
New York	766, 334	65, 447	831, 781	9, 907	841, 688
North Carolina	146, 735	223	146, 958	102, 125	249, 083
Ohio	509, 151	19, 309	528, 460	13, 732	542, 192
Oregon	28, 465	863	29, 328	450	29, 778
Pennsylvania	668, 462	32, 662	701, 124	13, 444	714, 568
Rhode Island	24, 928	3, 635	28, 563	639	29, 202
South Carolina	46, 102	124	46, 226	83, 050	129, 276
Tennessee	204, 757	665	205, 422	78, 524	283, 946
Texas	84, 729	3, 611	88, 340	34, 419	122, 759
Vermont	45, 713	3, 042	48, 755	188	48, 943
Virginia	161, 124	700	161, 824	130, 524	292, 348
West Virginia	106, 517	753	107, 270	4, 596	111, 866
Wisconsin	223, 384	25, 089	248, 473	1, 065	249, 538
Total	6, 529, 821	350, 352	6, 880, 173	1, 113, 729	7, 993, 902
Arizona	2, 380	1, 161	3, 541	643	4, 184
Dakota	13, 219	5, 539	18, 758	320	19, 078
District of Columbia	14, 804	306	15, 110	7, 439	22, 549
Idaho	3, 929	298	4, 227	38	4, 265
Montana	3, 614	189	3, 803	496	4, 299
New Mexico	12, 754	351	13, 105	1, 195	14, 300
Utah	18, 937	2, 324	21, 261	134	21, 395
Washington	10, 163	529	10, 692	954	11, 646
Wyoming	1, 526	249	1, 775	51	1, 826
Total	81, 326	10, 946	92, 272	11, 270	103, 542
Grand total	6, 611, 147	361, 298	6, 972, 445	1, 124, 999	8, 097, 444

[a] Including Oriental and Indian.

TABLE 17.—*The number, nativity, and race of the legal school population of each State and Territory in 1880.*

States and Territories.	Native white.	Foreign white.	Total white.	Colored.*a*	Total.
Alabama	213, 493	659	214, 152	208, 587	422, 739
Arkansas	210, 891	1, 127	212, 018	76, 834	288, 852
California	184, 309	9, 100	193, 409	7, 874	201, 283
Colorado	39, 710	8, 594	48, 304	794	44, 098
Connecticut	134, 699	8, 754	143, 453	2, 556	146, 009
Delaware	38, 842	779	39, 621	9, 268	48, 889
Florida	57, 585	1, 416	59, 001	56, 495	115, 496
Georgia	229, 592	280	229, 872	231, 144	461, 016
Illinois	983, 977	74, 583	1, 058, 559	15, 276	1, 073, 835
Indiana	682, 616	12, 107	694, 723	13, 459	708, 182
Iowa	579, 574	37, 417	616, 991	3, 609	620, 600
Kansas	338, 867	20, 278	359, 145	17, 406	376, 551
Kentucky	474, 409	2, 806	477, 215	71, 307	548, 522
Louisiana	127, 722	1, 502	129, 224	142, 190	271, 414
Maine	205, 889	13, 636	219, 525	669	220, 194
Maryland	239, 362	5, 647	245, 009	74, 192	319, 201
Massachusetts	802, 879	26, 832	829, 711	3, 309	833, 020
Michigan	460, 582	65, 652	526, 234	7, 529	533, 763
Minnesota	237, 867	49, 790	287, 657	1, 371	289, 028
Mississippi	185, 484	617	186, 101	272, 754	458, 855
Missouri	673, 181	15, 223	688, 404	50, 308	738, 712
Nebraska	140, 077	20, 960	161, 037	861	161, 898
Nevada	8, 567	723	9, 290	839	10, 129
New Hampshire	55, 531	5, 228	60, 759	140	60, 899
New Jersey	290, 376	15, 922	306, 298	10, 123	316, 421
New York	1, 151, 563	121, 433	1, 636, 996	18, 648	1, 655, 644
North Carolina	298, 206	481	298, 687	203, 820	502, 507
Ohio	1, 017, 911	38, 081	1, 055, 992	26, 984	1, 082, 976
Oregon	57, 940	1, 788	59, 728	2, 166	61, 894
Pennsylvania	1, 333, 311	64, 076	1, 397, 387	24, 990	1, 422, 377
Rhode Island	49, 891	7, 190	57, 081	1, 251	58, 332
South Carolina	94, 212	238	94, 450	167, 829	262, 279
Tennessee	414, 551	1, 343	415, 894	155, 359	571, 253
Texas	175, 001	7, 526	182, 527	69, 009	251, 536
Vermont	93, 006	6, 080	99, 086	377	99, 463
Virginia	825, 601	1, 453	826, 054	258, 988	585, 042
West Virginia	216, 268	1, 436	217, 704	9, 457	227, 161
Wisconsin	448, 708	51, 281	499, 989	2, 224	502, 213
Total	13, 135, 149	697, 138	13, 832, 287	2, 219, 996	16, 052, 283
Arizona	5, 296	2, 622	7, 918	1, 653	9, 571
Dakota	27, 697	11, 395	39, 092	650	39, 742
District of Columbia	29, 011	581	29, 592	13, 945	43, 537
Idaho	8, 214	634	8, 848	267	9, 115
Montana	7, 752	502	8, 254	1, 067	9, 321
New Mexico	26, 026	726	26, 752	2, 503	29, 255
Utah	38, 596	4, 636	43, 232	282	43, 514
Washington	20, 874	1, 162	22, 036	2, 603	24, 639
Wyoming	3, 392	533	3, 925	187	4, 112
Total	166, 858	22, 791	189, 649	23, 157	212, 806
Grand total	13, 302, 007	719, 929	14, 021, 936	2, 243, 153	16, 265, 089

a Including Oriental and Indian.



...RAM No. 29.—The number, in thousands, of colored, Indian, and Oriental persons in the legal school population, 1880.

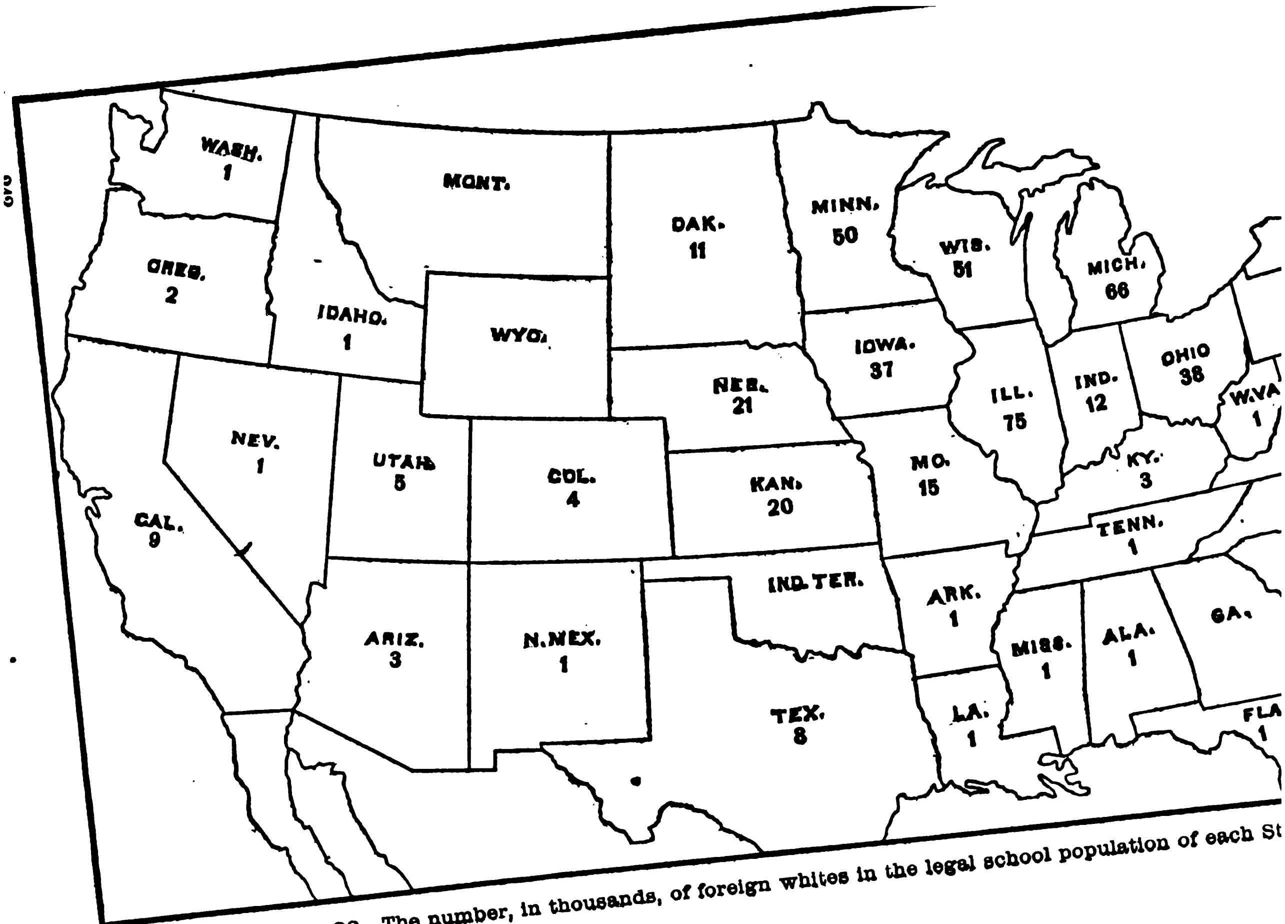


DIAGRAM No. 30.—The number, in thousands, of foreign whites in the legal school population of each St

TABLE 18.—*The illiteracy of persons* 10 *or more years old in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Persons 10 years of age and upward.				
	Enumerated.	Returned as unable to read.		Returned as unable to write.	
	Number.	Number.	Per cent.	Number.	Per cent.
	*		*		*
Maine	493, 847	13, 486	2. 7	19, 052	3. 9
New Hampshire	260, 426	7, 618	2. 9	9, 926	3. 8
Vermont	258, 751	15, 185	5. 9	17, 706	6. 8
Massachusetts	1, 160, 666	74, 935	6. 5	97, 742	8. 4
Rhode Island	173, 751	15, 416	8. 9	21, 921	12. 6
Connecticut	425, 806	19, 680	4. 6	29, 616	7. 0
New York	3, 378, 959	163, 501	4. 8	239, 271	7. 1
New Jersey	680, 687	37, 057	5. 4	54, 687	8. 0
Pennsylvania	2, 597, 809	131, 728	5. 1	222, 356	8. 6
Ohio	1, 953, 374	92, 720	4. 7	173, 172	8. 9
Michigan	873, 763	34, 613	4. 0	53, 127	6. 1
Indiana	1, 197, 036	76, 634	6. 4	127, 124	10. 6
Wisconsin	751, 704	35, 031	4. 7	55, 441	7. 4
Illinois	1, 809, 606	86, 368	4. 8	133, 584	7. 4
Minnesota	305, 568	12, 747	4. 2	24, 413	8. 0
Iowa	837, 959	24, 115	2. 9	45, 671	5. 5
Nebraska	88, 265	2, 365	2. 7	4, 861	5. 5
Kansas	258, 051	16, 369	6. 2	24, 550	9. 5
Total Northern Division	17, 507, 018	859, 568	4. 9	1, 354, 220	7. 7
Delaware	92, 586	19, 356	20. 9	23, 100	25. 0
Maryland	575, 439	114, 100	19. 8	135, 499	23. 6
District of Columbia	100, 453	22, 845	22. 7	28, 719	28. 6
Virginia	890, 056	390, 913	43. 9	445, 893	50. 1
West Virginia	308, 424	48, 802	15. 8	81, 490	26. 4
Kentucky	930, 136	249, 567	26. 8	332, 176	35. 7
North Carolina	769, 629	339, 789	44. 1	397, 690	51. 7
Tennessee	890, 872	290, 549	32. 6	364, 697	40. 9
South Carolina	503, 763	265, 892	52. 8	290, 379	57. 6
Georgia	835, 929	418, 553	50. 1	468, 593	56. 1
Alabama	706, 802	349, 771	49. 5	383, 012	54. 2
Florida	131, 119	66, 238	50. 5	71, 803	54. 8
Mississippi	581, 206	291, 718	50. 2	313, 310	53. 9
Missouri	1, 205, 568	146, 771	12. 2	222, 411	18. 5
Arkansas	341, 737	111, 799	32. 7	133, 339	39. 0
Louisiana	526, 392	257, 184	48. 9	276, 158	52. 5
Texas	571, 075	189, 423	33. 2	221, 703	38. 8
Total Southern Division	9, 961, 186	3, 573, 270	35. 9	4, 189, 972	42. 1
California	430, 444	24, 877	5. 8	31, 716	7. 4
Oregon	64, 685	2, 609	4. 1	4, 427	6. 8
Nevada	36, 655	727	2. 0	872	2. 4
Colorado	30, 349	6, 297	20. 7	6, 823	22. 5
Arizona	8, 237	2, 690	32. 7	2, 753	32. 4
Washington	17, 334	1, 018	5. 9	1, 307	7. 5
Idaho	13, 189	3, 293	2. 5	3, 388	25. 7
Utah	56, 515	2, 515	4. 5	7, 363	13. 0
Montana	18, 170	667	3. 7	918	5. 1
Dakota	10, 640	1, 249	11. 7	1, 563	14. 7
Wyoming	8, 059	408	5. 8	602	7. 5
New Mexico	66, 464	48, 836	73. 5	52, 220	78. 6
Total Pacific Division	760, 741	95, 246	12. 5	113, 952	15. 0
Grand total	28, 228, 945	4, 528, 084	16. 0	5, 658, 144	20. 0

TABLE 19.—*The illiteracy of persons 10 or more years old in* 1880.

States and Territories.	Persons 10 years of age and upward.				
	Enumerated.	Returned as unable to read.		Returned as unable to write.	
	Number.	Number.	Per cent.	Number.	Per cent.
Maine	519,669	18,181	3.5	22,170	4.3
New Hampshire	286,188	11,982	4.2	14,302	5.0
Vermont	264,052	12,993	4.9	15,837	6.0
Massachusetts	1,432,183	75,635	5.3	93,980	6.5
Rhode Island	220,461	17,456	7.9	24,793	11.2
Connecticut	497,303	20,986	4.2	28,424	5.7
New York	3,981,428	166,625	4.2	219,600	5.5
New Jersey	865,591	39,136	4.5	53,249	6.2
Pennsylvania	3,203,215	146,138	4.6	228,014	7.1
Ohio	2,399,367	86,754	3.6	131,847	5.5
Michigan	1,236,686	47,112	3.8	63,723	5.2
Indiana	1,468,095	70,008	4.8	110,761	7.5
Wisconsin	965,712	38,693	4.0	55,558	5.8
Illinois	2,269,315	96,809	4.3	145,397	6.4
Minnesota	559,977	20,551	3.7	34,546	6.2
Iowa	1,181,641	28,117	2.4	46,609	3.9
Nebraska	318,271	7,830	2.5	11,528	3.6
Kansas	704,297	25,503	3.6	39,476	5.6
Total Northern Division	22,373,451	930,509	4.1	1,338,814	5.9
Delaware	110,856	16,912	15.3	19,414	17.5
Maryland	695,364	111,387	16.0	134,488	19.3
District of Columbia	136,907	21,541	15.7	25,778	18.8
Virginia	1,059,034	360,495	34.0	430,352	40.6
West Virginia	428,587	52,041	12.1	85,376	19.9
Kentucky	1,163,498	258,186	22.2	348,392	29.9
North Carolina	959,951	367,890	38.3	463,975	48.3
Tennessee	1,062,130	294,385	27.7	410,722	38.7
South Carolina	667,456	321,780	48.2	369,848	55.4
Georgia	1,043,840	446,683	42.8	520,416	49.9
Alabama	851,780	370,279	43.5	433,447	50.9
Florida	184,650	70,219	38.0	80,183	43.4
Mississippi	753,693	315,612	41.9	373,201	49.5
Missouri	1,557,631	138,818	8.9	208,754	13.4
Arkansas	531,876	153,229	28.8	202,015	38.0
Louisiana	649,070	297,312	45.8	318,380	49.1
Texas	1,064,196	256,223	24.1	316,432	29.7
Total Southern Division	12,920,519	3,852,992	29.8	4,741,173	36.6
California	681,062	48,583	7.1	53,430	7.8
Oregon	130,565	5,376	4.1	7,423	5.7
Nevada	50,666	3,703	7.3	4,069	8.0
Colorado	158,220	9,321	5.9	10,474	6.6
Arizona	32,922	5,496	16.7	5,842	17.7
Washington	55,720	3,191	5.7	3,889	7.0
Idaho	25,005	1,384	5.5	1,778	7.1
Utah	97,194	4,851	5.0	8,826	9.1
Montana	31,989	1,530	4.8	1,707	5.3
Dakota	99,849	3,094	3.1	4,821	4.8
Wyoming	16,479	427	2.6	556	3.4
New Mexico	87,966	52,994	60.2	57,156	65.0
Total Pacific Division	1,467,637	129,950	9.0	159,971	10.0
Grand total	36,761,609	4,923,451	13.4	6,239,958	17.0

TABLE 20.—*The illiteracy of native and foreign-born whites 10 or more years old in 1880.*

States and Territories.	Native white persons 10 years of age and upward.			Foreign-born white persons 10 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	Number.	Number.	Per cent.	Number.	Number.	Per cent.
Maine	463, 158	8, 775	1. 9	54, 858	12, 983	23. 7
New Hampshire	212. 811	2, 710	1. 1	42, 783	11, 498	26. 9
Vermont	224, 361	5, 354	2. 4	38, 884	10, 327	26. 6
Massachusetts	990, 160	6, 938	0. 7	426. 607	83, 725	19. 6
Rhode Island	144, 596	4, 261	2. 9	70, 562	19, 283	27. 3
Connecticut	361, 738	3, 728	1. 0	126, 047	23, 035	18. 3
New York	2, 742, 847	59, 516	2. 2	1, 184, 756	148, 659	12. 5
New Jersey	618, 941	20, 093	3. 2	216, 444	23, 956	11. 1
Pennsylvania	2, 562, 458	123, 206	4. 8	574, 103	86, 775	15. 1
Ohio	1, 952, 858	83, 183	4. 3	386, 670	32, 308	8. 4
Michigan	854, 925	19, 981	2. 3	364, 981	38, 951	10. 7
Indiana	1, 297, 159	87, 786	6. 8	141, 796	12, 612	8. 9
Wisconsin	566, 745	11, 494	2. 0	394, 688	42, 739	10. 8
Illinois	1, 666, 214	88, 519	5. 3	568, 264	43, 907	7. 7
Minnesota	300, 747	5, 671	1. 9	256, 436	27, 835	10. 9
Iowa	918, 728	23, 660	2. 6	255, 840	20, 677	8. 1
Nebraska	224, 899	5, 102	2. 3	91, 418	5, 824	6. 4
Kansas	568, 380	17, 825	3. 1	104, 741	7, 063	6. 7
Total Northern Division	16, 701, 715	577, 797	3. 4	5, 299, 268	652, 157	12. 3
Delaware	82, 818	6, 630	8. 1	9, 298	1, 716	18. 5
Maryland	462, 697	36, 027	7. 8	81, 389	8, 289	10. 2
District of Columbia	75, 025	1, 950	2. 6	16, 847	2, 038	12. 1
Virginia	616, 814	113, 915	18. 5	14, 270	777	5. 4
West Virginia	392, 242	72, 826	18. 6	17, 899	2, 411	13. 5
Kentucky	914, 811	208, 796	22. 8	58, 964	5, 701	9. 7
North Carolina	605, 244	191, 913	31. 7	3, 562	119	3. 3
Tennessee	774, 411	214, 994	27. 8	16, 333	1, 238	7. 5
South Carolina	265, 356	59, 415	22. 4	7, 350	362	4. 9
Georgia	553, 769	128, 362	23. 2	10, 208	572	5. 6
Alabama	443, 327	111, 040	25. 0	9, 395	727	7. 7
Florida	91, 749	19, 024	20. 7	7, 388	739	10. 0
Mississippi	319, 385	52, 910	16. 6	8, 911	538	6. 0
Missouri	1, 244, 738	137, 949	11. 1	208, 500	14, 561	7. 0
Arkansas	384, 060	97, 990	25. 5	9, 845	532	5. 6
Louisiana	268, 600	53, 261	19. 8	52, 817	5, 690	10. 9
Texas	701, 969	97, 498	13. 9	106, 962	26, 414	24. 7
Total Southern Division	8, 195, 515	1, 604, 500	19. 5	639, 433	72, 439	11. 3
California	374, 772	7, 660	2. 0	214, 468	18, 430	8. 6
Oregon	99, 028	3, 433	3. 5	20, 454	910	4. 4
Nevada	22, 660	240	1. 1	19, 935	1, 675	8. 4
Colorado	117, 182	8, 373	7. 1	38, 324	1, 533	4. 0
Arizona	15, 200	1, 225	8. 1	13, 484	3, 599	26. 8
Washington	37, 278	895	2. 4	11, 991	534	4. 5
Idaho	15, 011	448	3. 0	6, 470	341	5. 3
Utah	53, 944	3, 183	5. 9	41, 932	4, 954	11. 8
Montana	19, 628	272	1. 4	9, 358	359	3. 8
Dakota	51, 229	938	1. 8	47, 119	3, 224	6. 8
Wyoming	10, 458	177	1. 7	4, 782	197	4. 1
New Mexico	72, 219	46, 329	64. 2	7, 548	3, 268	43. 3
Total Pacific Division	888, 559	73, 168	8. 2	435, 910	39, 024	8. 1
Grand total	25, 785, 789	2, 255, 460	8. 7	6, 374, 611	763, 620	11. 8

TABLE 21.—*The illiteracy of white and colored persons 10 or more years old in 1870.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	White persons 10 years of age and upward.			Colored persons 10 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	Number.	Number.	Per cent.	Number.	Number.	Per cent.
	*	*	*	*	*	*
Maine	492, 128	18, 874	3. 8	1, 719	178	10. 3
New Hampshire	259, 904	9, 831	3. 8	522	95	18. 2
Vermont	257, 993	17, 584	6. 8	758	122	16. 1
Massachusetts	1, 148, 990	95, 578	8. 3	11, 676	2, 164	18. 5
Rhode Island	169, 479	21, 029	12. 4	4, 272	892	20. 9
Connecticut	417, 804	27, 913	6. 7	8, 092	1, 703	21. 0
New York	3, 336, 198	228, 424	6. 8	42, 761	10, 847	25. 4
New Jersey	656, 972	46, 386	7. 1	23, 715	8, 301	35. 4
Pennsylvania	2, 546, 344	206, 458	8. 1	51, 465	15, 898	30. 9
Ohio	1, 906, 494	152, 383	8. 0	46, 880	20, 789	44. 3
Michigan	861, 523	48, 649	5. 6	12, 240	4, 478	36. 6
Indiana	1, 179, 792	118, 761	10. 1	18, 144	8, 363	46. 1
Wisconsin	749, 181	54, 845	7. 3	2, 523	596	23. 6
Illinois	1, 788, 175	123, 624	6. 9	21, 431	9, 900	46. 5
Minnesota	304, 418	23, 941	7. 9	1, 150	472	41. 0
Iowa	833, 698	44, 145	5. 3	4, 261	1, 526	35. 8
Nebraska	87, 562	4, 630	5. 3	703	231	32. 9
Kansas	245, 267	16, 978	6. 9	12, 784	7, 572	59. 1
Northern Division	17, 241, 922	1, 260, 033	7. 3	265, 096	94, 187	35. 5
Delaware	76, 016	11, 280	14. 8	16, 570	11, 820	71. 3
Maryland	447, 731	46, 792	10. 4	127, 708	88, 707	69. 5
District of Columbia	66, 620	4, 876	7. 3	33, 833	23, 843	70. 5
Virginia	527, 432	123, 538	23. 4	362, 624	322, 355	88. 9
West Virginia	295, 519	71, 493	24. 2	12, 905	9, 997	77. 4
Kentucky	773, 653	201, 077	26. 0	156, 483	131, 099	83. 8
North Carolina	497, 132	166, 397	33. 5	272, 497	231, 293	84. 8
Tennessee	665, 390	178, 727	26. 9	225, 482	185, 970	82. 4
South Carolina	213, 794	55, 167	25. 8	289, 969	235, 212	81. 1
Georgia	462, 718	124, 939	27. 0	373, 211	343, 654	92. 1
Alabama	377, 967	92, 059	24. 4	328, 835	290, 953	88. 1
Florida	68, 371	18, 904	27. 6	62, 748	52, 899	84. 1
Mississippi	276, 132	48, 028	17. 4	305, 074	265, 282	87. 0
Missouri	1, 122, 175	161, 763	14. 4	83, 393	60, 648	72. 7
Arkansas	256, 488	64, 095	25. 0	85, 249	69, 244	81. 2
Louisiana	264, 033	50, 749	19. 2	262, 359	225, 409	85. 9
Texas	401, 110	70, 895	17. 7	169, 965	150, 808	88. 7
Southern Division	6, 792, 281	1, 490, 779	21. 9	3, 168, 905	2, 699, 193	85. 2
California	372, 493	26, 158	7. 0	57, 951	5, 558	9. 6
Oregon	60, 846	3, 411	5. 6	3, 839	1, 016	26. 5
Nevada	33, 175	653	2. 0	3, 480	219	6. 3
Colorado	29, 819	6, 564	22. 0	530	259	48. 9
Arizona	8, 170	2, 729	33. 3	67	24	35. 8
Washington	15, 873	823	5. 2	1, 461	484	33. 1
Idaho	8, 839	486	5. 5	4, 350	2, 902	66. 7
Utah	55, 828	7, 097	12. 7	687	266	38. 7
Montana	15, 925	643	4. 0	2, 245	275	12. 2
Dakota	9, 766	914	9. 4	874	649	74. 3
Wyoming	7, 709	481	6. 2	350	121	34. 6
New Mexico	65, 224	51, 140	78. 4	1, 240	1, 080	87. 1
Pacific Division	683, 667	101, 099	14. 8	77, 074	12, 853	16. 7
Grand total	24, 717, 870	2, 851, 911	11. 5	3, 511, 075	2, 806, 233	79. 9

TABLE 22.—*The illiteracy of white and colored persons* 10 *or more years old in* 1880.

States and Territories.	White persons 10 years of age and upward.			Colored persons 10 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	Number.	Number.	Per cent.	Number.	Number.	Per cent.
Maine	518, 011	21, 758	4. 2	1, 658	412	24. 9
New Hampshire	285, 594	14, 208	5. 0	594	94	15. 8
Vermont	269, 245	15, 681	6. 0	807	156	19. 3
Massachusetts	1, 416, 767	90, 658	6. 4	15, 416	2, 322	15. 1
Rhode Island	215, 158	23, 544	10. 9	5, 303	1, 249	23. 6
Connecticut	487, 780	26, 763	5. 5	9, 523	1, 661	17. 4
New York	3, 927, 603	208, 175	5. 3	53, 825	11, 425	21. 2
New Jersey	835, 385	44, 049	5. 3	30, 206	9, 200	30. 5
Pennsylvania	3, 136, 561	209, 961	6. 7	66, 654	18, 033	27. 1
Ohio	2, 339, 528	115, 491	4. 9	59, 839	16, 356	27. 9
Michigan	1, 219, 906	58, 932	4. 8	16, 780	4, 791	28. 5
Indiana	1, 438, 955	100, 398	7. 0	29, 140	10, 363	35. 6
Wisconsin	961, 433	54, 233	5. 6	4, 279	1, 325	31. 0
Illinois	2, 234, 478	132, 426	5. 9	34, 637	12, 971	37. 2
Minnesota	557, 183	33, 506	6. 0	2, 794	1, 040	37. 2
Iowa	1, 174, 063	44, 337	3. 8	7, 578	2, 272	30. 0
Nebraska	316, 312	10, 926	3. 5	1, 959	602	30. 7
Kansas	673, 121	24, 888	3. 7	31, 176	14, 588	46. 8
Northern Division	22, 001, 083	1, 229, 954	5. 5	372, 368	108, 860	29. 2
Delaware	91, 611	8, 346	9. 1	19, 245	11, 068	57. 5
Maryland	544, 066	44, 316	8. 1	151, 278	90, 172	59. 6
District of Columbia	91, 672	3, 988	4. 3	45, 035	21, 790	48. 4
Virginia	630, 584	114, 692	18. 2	428, 450	315, 660	73. 7
West Virginia	410, 141	75, 237	18. 3	18, 446	10, 139	55. 0
Kentucky	973, 275	214, 497	22. 0	190, 223	133, 895	70. 4
North Carolina	608, 806	192, 032	31. 5	351, 145	271, 943	77. 4
Tennessee	790, 744	216, 227	27. 3	271, 386	194, 495	71. 7
South Carolina	272, 706	59, 777	21. 9	394, 750	310, 071	78. 5
Georgia	563, 977	128, 934	22. 9	479, 863	391, 482	81. 6
Alabama	452, 722	111, 767	24. 7	399, 058	321, 680	80. 6
Florida	99, 137	19, 763	19. 9	85, 513	60, 420	70. 7
Mississippi	328, 296	53, 448	16. 3	425, 397	319, 753	75. 2
Missouri	1, 453, 238	152, 510	10. 5	104, 393	56, 244	53. 9
Arkansas	393, 905	98, 542	25. 0	137, 971	103, 473	75. 0
Louisiana	320, 917	58, 951	18. 4	328, 153	259, 429	79. 1
Texas	808, 931	123, 912	15. 3	255, 265	192, 520	75. 4
Southern Division	8, 834, 948	1, 676, 939	18. 9	4, 085, 571	3, 064, 234	75. 0
California	589, 295	26, 090	4. 4	91, 827	27, 340	29. 8
Oregon	119, 482	4, 343	3. 6	11, 083	3, 080	27. 8
Nevada	42, 595	1, 915	4. 5	8, 071	2, 154	26. 7
Colorado	155, 456	9, 906	6. 4	2, 764	568	20. 5
Arizona	28, 634	4, 824	16. 8	4, 288	1, 018	23. 7
Washington	49, 269	1, 429	2. 9	6, 451	2, 460	38. 1
Idaho	21, 481	784	3. 6	3, 524	994	28. 2
Utah	95, 876	8, 137	8. 5	1, 318	689	52. 3
Montana	28, 986	631	2. 2	3, 003	1, 076	35. 8
Dakota	98, 348	4, 157	4. 2	1, 501	664	44. 2
Wyoming	15, 240	374	2. 5	1, 239	182	14. 7
New Mexico	79, 767	49, 597	62. 2	8, 199	7, 559	92. 2
Pacific Division	1, 324, 369	112, 187	8. 4	143, 268	47, 784	33. 4
Grand total	32, 130, 400	3, 019, 080	9. 4	4, 601, 207	3, 220, 878	70. 0

TABLE 23.—*The illiteracy of white persons* 10 *to* 14 *years old in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	White persons 10 to 14 years of age, both inclusive.			White males 10 to 14 years of age, both inclusive.			White females 10 to 14 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
		*	*			*			*
Maine	69, 874	3, 150	4. 5	35, 753	1, 782	5. 0	34, 121	1, 368	4. 0
New Hampshire	31, 808	833	2. 6	16, 538	456	2. 8	15, 270	377	2. 5
Vermont	34, 854	1, 850	5. 3	17, 836	1, 035	5. 8	17, 018	815	4. 8
Massachusetts	147, 149	4, 359	3. 0	73, 675	2, 215	3. 0	73, 474	2, 144	2. 9
Rhode Island	22, 114	2, 484	11. 2	11, 162	1, 289	11. 6	10, 952	1, 195	10. 9
Connecticut	54, 133	2, 530	4. 7	27, 630	1, 339	4. 8	26, 503	1, 191	4. 5
New York	478, 639	19, 899	4. 2	240, 909	10, 772	4. 5	237, 730	9, 127	3. 8
New Jersey	100, 344	5, 533	5. 5	50, 619	2, 987	5. 9	49, 725	2, 546	5. 1
Pennsylvania	415, 580	10, 688	2. 6	209, 747	5, 735	2. 7	205, 833	4, 953	2. 4
Ohio	326, 746	26, 436	8. 1	165, 227	15, 064	9. 1	161, 519	11, 372	7. 0
Michigan	138, 428	8, 022	5. 8	70, 608	4, 728	6. 7	67, 820	3, 294	4. 9
Indiana	220, 420	10, 361	4. 7	112, 216	5, 582	5. 0	108, 204	4, 779	4. 4
Wisconsin	139, 610	9, 274	6. 6	71, 009	5, 030	7. 1	68, 601	4, 244	6. 2
Illinois	318, 948	11, 865	3. 7	162, 668	6, 562	4. 0	156, 280	5, 303	3. 4
Minnesota	55, 018	3, 802	6. 9	28, 212	2, 122	7. 5	26, 806	1, 680	6. 3
Iowa	154, 436	5, 858	3. 8	79, 169	3, 401	4. 3	75, 267	2, 457	3. 3
Nebraska	13, 049	1. 976	15. 1	6, 774	1, 167	17. 2	6, 275	809	12. 9
Kansas	39, 404	2, 590	6. 6	20, 347	1, 491	7. 3	19, 057	1, 099	5. 8
Northern Division	2, 760, 554	131, 510	4. 8	1, 400, 099	72, 757	5. 2	1, 360, 455	58, 753	4. 3
Delaware	12, 954	1, 878	14. 5	6, 554	1, 045	15. 9	6, 400	833	13. 0
Maryland	73, 904	7, 927	10. 7	37, 415	4, 274	11. 4	36, 489	3, 653	10. 0
District of Columbia	9, 529	659	6. 9	4, 651	366	7. 9	4, 878	293	6. 0
Virginia	93, 060	34, 103	36. 6	47, 652	18, 745	39. 3	45, 408	15, 358	33. 8
West Virginia	57, 432	20, 046	34. 9	29, 403	10, 704	36. 4	28, 029	9, 342	33. 3
Kentucky	147, 302	57, 766	39. 2	75, 306	31, 752	42. 2	71, 996	26, 014	36. 1
North Carolina	92, 349	38, 647	41. 8	46, 984	20, 240	43. 1	45, 365	18, 407	40. 6
Tennessee	128, 075	38, 878	30. 3	65, 918	20, 887	31. 7	62, 157	17, 991	28. 9
South Carolina	39, 223	13, 674	34. 9	20, 125	7, 299	36. 3	19, 098	6, 375	33. 4
Georgia	91, 489	36, 497	39. 9	46, 522	19, 843	42. 7	44, 967	16, 654	37. 0
Alabama	76, 361	24, 230	31. 7	38, 857	13, 214	34. 0	37, 504	11, 016	29. 4
Florida	13, 493	5, 083	37. 6	6, 941	2, 691	38. 8	6, 552	2, 392	36. 5
Mississippi	53, 646	14, 729	27. 5	27, 709	8, 174	29. 2	25, 937	6, 555	25. 3
Missouri	210, 479	49, 373	23. 5	107, 865	27, 509	25. 5	102, 614	21, 864	21. 3
Arkansas	52, 514	14, 799	28. 2	27, 186	7, 985	29. 4	25, 328	6, 814	26. 9
Louisiana	48, 276	13, 525	28. 0	24, 126	7, 130	29. 5	24, 150	6, 395	26. 5
Texas	81, 552	19, 919	24. 4	42, 114	11, 171	26. 5	39, 438	8, 748	22. 2
Southern Division	1, 281, 638	391, 733	30. 6	655, 328	213, 029	32. 5	626, 310	178, 704	28. 6
California	49, 523	1, 941	3. 9	25, 334	1, 092	4. 3	24, 189	849	3. 5
Oregon	11, 352	960	8. 5	5, 813	572	9. 8	5, 539	388	7. 0
Nevada	1, 850	23	1. 2	910	8	0. 9	940	15	1. 6
Colorado	3, 304	970	29. 4	1, 670	483	28. 9	1, 634	487	29. 8
Arizona	607	299	49. 3	340	177	52. 1	267	122	45. 7
Washington	2, 253	129	5. 7	1, 196	71	5. 9	1, 057	58	5. 5
Idaho	567	36	6. 3	281	17	6. 0	286	19	6. 5
Utah	11, 567	2, 828	24. 4	5, 846	1, 539	26. 3	5, 721	1, 289	22. 5
Montana	745	105	14. 1	392	69	17. 6	353	36	10. 2
Dakota	1, 138	114	10. 0	588	56	9. 5	550	58	10. 5
Wyoming	267	41	15. 4	140	22	15. 7	127	19	15. 0
New Mexico	11, 096	9, 423	84. 9	5, 488	4, 530	82. 5	5, 608	4, 893	87. 2
Pacific Division	94, 269	16, 869	17. 9	47, 998	8, 636	18. 0	46, 271	8, 233	17. 8
Grand total	4, 136, 461	540, 112	13. 1	2, 103, 425	294, 422	14. 0	2, 033, 036	245, 690	12. 1

TABLE 24.—*The illiteracy of white persons 10 to 14 years old in 1880.*

States and Territories.	White persons 10 to 14 years of age, both inclusive.			White males 10 to 14 years of age, both inclusive.			White females 10 to 14 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	64, 781	2, 182	3. 4	33, 153	1, 294	3. 9	31, 628	888	2. 8
New Hampshire	30, 605	1, 233	4. 0	15, 477	635	4. 1	15, 128	598	4. 0
Vermont	33, 449	1, 210	3. 6	17, 150	728	4. 2	16, 299	482	3. 0
Massachusetts	159, 921	1, 949	1. 2	80, 270	996	1. 2	79, 651	953	1. 2
Rhode Island	25, 587	2, 122	8. 3	12, 879	1, 156	9. 0	12, 708	966	7. 6
Connecticut	58, 456	1, 273	2. 2	29, 543	715	2. 4	28, 913	558	1. 9
New York	505, 144	12, 152	2. 4	254, 441	6, 691	2. 6	250, 703	5, 461	2. 2
New Jersey	116, 569	3, 484	3. 0	58, 614	1, 957	3. 3	57, 955	1, 527	2. 6
Pennsylvania	472, 606	19, 368	4. 1	239, 304	11, 376	4. 8	233, 302	7, 992	3. 4
Ohio	358, 269	12, 466	3. 5	181, 491	7, 230	4. 0	176, 778	5, 236	3. 0
Michigan	175, 904	5, 124	2. 9	89, 780	3, 028	3. 4	86, 124	2, 096	2. 4
Indiana	238, 068	13, 241	5. 6	121, 245	7, 518	6. 2	116, 823	5, 723	4. 9
Wisconsin	152, 837	4, 151	2. 7	77, 419	2, 250	2. 9	75, 418	1, 901	2. 5
Illinois	357, 748	19, 413	5. 4	180, 959	11, 180	6. 2	176, 789	8, 233	4. 7
Minnesota	87, 386	3, 317	3. 8	44, 228	1, 842	4. 2	43, 158	1, 475	3. 4
Iowa	195, 178	5, 051	2. 6	99, 409	3, 047	3. 1	95, 769	2, 004	2. 1
Nebraska	49, 719	2, 145	4. 3	25, 906	1, 255	4. 8	23, 813	890	3. 7
Kansas	114, 839	5, 441	4. 7	59, 831	3, 319	5. 5	55, 008	2, 122	3. 9
Northern Division	3, 197, 066	115, 322	3. 6	1, 621, 099	66, 217	4. 0	1, 575, 967	49, 105	3. 1
Delaware	13, 178	1, 017	7. 7	6, 760	587	8. 7	6, 418	430	6. 7
Maryland	82, 130	5, 548	6. 8	41, 439	3, 128	7. 5	40, 691	2, 420	5. 9
District of Columbia	12, 670	231	1. 8	6, 348	129	2. 0	6, 322	102	1. 6
Virginia	103, 948	27, 094	26. 1	53, 157	15, 196	28. 6	50, 791	11, 898	23. 4
West Virginia	76, 214	19, 911	26. 1	39, 162	10, 850	27. 7	37, 052	9, 061	24. 5
Kentucky	173, 312	55, 558	32. 1	88, 386	30, 524	34. 5	84, 926	25, 034	29. 5
North Carolina	99, 797	45, 324	45. 4	51, 757	24, 592	47. 5	48, 040	20, 732	43. 2
Tennessee	142, 267	61, 316	43. 1	73, 004	33, 536	45. 9	69, 263	27, 780	40. 1
South Carolina	45, 200	15, 328	33. 9	22, 984	8, 242	35. 9	22, 216	7, 086	31. 9
Georgia	96, 137	35, 972	37. 4	49, 475	20, 018	40. 5	46, 662	15, 954	34. 2
Alabama	77, 782	31, 788	40. 9	40, 156	17, 442	43. 4	37, 626	14, 346	38. 1
Florida	17, 028	5, 581	32. 8	8, 708	3, 047	35. 0	8, 320	2, 524	30. 5
Mississippi	57, 805	16, 860	29. 2	29, 694	9, 624	32. 4	28, 111	7, 236	25. 7
Missouri	250, 789	40, 880	16. 3	127, 940	23, 252	18. 2	122, 849	17, 628	14. 3
Arkansas	72, 133	31, 668	43. 9	37, 249	17, 229	46. 3	34, 884	14, 439	41. 4
Louisiana	54, 072	14, 363	26. 6	26, 995	7, 565	28. 0	27, 077	6, 798	25. 1
Texas	138, 719	39, 707	28. 6	71, 635	22, 762	31. 8	67, 084	16, 945	25. 3
Southern Division	1, 513, 181	448, 146	29. 6	774, 849	247, 723	31. 9	738, 332	200, 423	27. 1
California	77, 934	1, 517	1. 9	39, 077	821	2. 1	38, 857	696	1. 8
Oregon	18, 617	1, 112	6. 0	9, 460	687	7. 3	9, 157	425	4. 6
Nevada	3, 728	37	1. 0	1, 863	17	0. 9	1, 865	20	1. 1
Colorado	13, 026	1, 575	12. 1	6, 643	785	11. 8	6, 383	790	12. 4
Arizona	2, 321	551	23. 7	1, 297	334	25. 8	1, 024	217	21. 2
Washington	6, 955	330	4. 7	3, 651	207	5. 7	3, 304	123	3. 7
Idaho	2, 730	192	7. 0	1, 397	108	7. 7	1, 333	84	6. 3
Utah	17, 735	1, 904	10. 7	9, 000	1, 072	11. 9	8, 735	832	9. 5
Montana	2, 060	55	2. 7	1, 058	28	2. 6	1, 002	27	2. 7
Dakota	11, 481	621	5. 4	6, 040	355	5. 9	5, 441	266	4. 9
Wyoming	1, 218	58	4. 8	654	38	5. 8	564	20	3. 5
New Mexico	12, 479	7, 774	62. 3	6, 484	3, 910	60. 3	5, 995	3, 864	64. 5
Pacific Division	170, 284	15, 726	9. 2	86, 624	8, 362	9. 6	83, 660	7, 364	8. 8
Grand total	4, 880, 531	579, 194	11. 8	2, 482, 572	322, 302	12. 9	2, 397, 959	256, 892	10. 7

TABLE 25.—*The illiteracy of white persons 15 to 20 years old in 1870.*

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	White persons 15 to 20 years old, both inclusive.			White males 15 to 20 years old, both inclusive.			White females 15 to 20 years old, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
	*	*	*	*		*	*		*
Maine	79, 514	2, 433	3. 1	39, 796	1, 247	3. 1	39, 718	1, 186	3. 0
New Hampshire	38, 266	1, 412	3. 7	18, 681	712	3. 8	19, 585	700	3. 6
Vermont	40, 553	2, 422	5. 9	20, 459	1, 317	6. 4	20, 094	1, 105	5. 5
Massachusetts	172, 346	7, 407	4. 3	81, 561	3, 013	3. 7	90, 785	4, 394	4. 8
Rhode Island	26, 148	2, 473	9. 5	12, 367	1, 090	8. 4	13, 781	1, 383	10. 0
Connecticut	61, 105	2, 710	4. 4	29, 967	1, 266	4. 2	31, 138	1, 444	4. 6
New York	532, 429	18, 573	3. 5	251, 069	8, 138	3. 2	281, 360	10, 435	3. 7
New Jersey	103, 248	4, 422	4. 3	49, 562	2, 113	4. 3	53, 686	2, 309	4. 3
Pennsylvania	432, 655	18, 159	4. 2	209, 613	8, 504	4. 1	223, 042	9, 655	4. 3
Ohio	336, 605	16, 059	4. 6	162, 252	8, 568	5. 3	174, 353	7, 491	4. 3
Michigan	142, 199	5, 098	3. 6	71, 690	2, 973	4. 1	70, 509	2, 125	3. 0
Indiana	219, 702	14, 418	6. 6	109, 172	7, 325	6. 7	110, 530	7, 093	6. 4
Wisconsin	131, 050	5, 264	4. 0	64, 968	2, 777	4. 3	66, 082	2, 487	3. 8
Illinois	312, 007	14, 101	4. 5	155, 235	7, 208	4. 6	156, 772	6, 893	4. 4
Minnesota	47, 925	1, 989	4. 2	24, 282	1, 014	4. 2	23, 643	975	4. 1
Iowa	140, 305	3, 680	2. 5	74, 401	2, 044	2. 8	71, 904	1, 636	2. 3
Nebraska	12, 832	529	4. 1	6, 633	317	4. 8	6, 199	212	3. 4
Kansas	38, 629	2, 219	5. 7	19, 879	1, 311	6. 6	18, 750	908	4. 8
Northern Division	2, 873, 518	123, 368	4. 3	1, 401, 587	60, 937	4. 3	1, 471, 931	62, 431	4. 2
Delaware	13, 066	1, 370	10. 5	6, 549	718	11. 0	6, 517	652	10. 0
Maryland	77, 654	6, 099	7. 9	36, 861	3, 022	8. 2	40, 793	3, 077	7. 5
District of Columbia	10, 002	461	4. 6	4, 327	150	3. 5	5, 675	311	5. 5
Virginia	94, 056	21, 438	22. 8	45, 170	11, 095	24. 6	48, 886	10, 343	21. 2
West Virginia	55, 256	11, 721	21. 2	27, 087	5, 808	21. 4	28, 169	5, 913	21. 0
Kentucky	144, 704	36, 760	25. 4	70, 993	18, 724	26. 4	73, 711	18, 036	25. 8
North Carolina	94, 782	31, 911	33. 7	46, 268	15, 384	33. 2	48, 514	16, 527	34. 1
Tennessee	128, 765	33, 311	25. 9	62, 852	15, 962	25. 4	65, 913	17, 349	26. 3
South Carolina	40, 765	11, 102	27. 2	19, 430	5, 411	27. 8	21, 335	5, 691	26. 7
Georgia	92, 695	26, 012	28. 1	44, 302	13, 101	29. 6	48, 393	12, 911	26. 7
Alabama	77, 709	19, 399	24. 8	37, 071	9, 642	26. 0	40, 638	9, 757	24. 0
Florida	13, 653	4, 345	31. 8	6, 614	2, 146	32. 4	7, 039	2, 199	31. 2
Mississippi	56, 442	10, 196	18. 1	27, 804	5, 447	19. 6	28, 638	4, 749	16. 6
Missouri	201, 229	27, 486	13. 6	99, 593	14, 755	14. 8	101, 636	12, 731	12. 5
Arkansas	55, 413	13, 916	25. 1	27, 709	6, 703	24. 2	27, 704	7, 213	26. 0
Louisiana	47, 764	9, 636	20. 2	21, 967	4, 710	21. 4	25, 797	4, 926	19. 1
Texas	78, 208	13, 626	17. 4	38, 545	7, 144	18. 5	39, 663	6, 482	16. 3
Southern Division	1, 282, 163	278, 789	21. 7	623, 142	139, 922	20. 9	[illegible]59, 021	138, 867	21. 1
California	41, 740	2, 018	4. 8	21, 322	1, 179	5. 5	20, 418	839	4. 1
Oregon	9, 783	270	2. 8	4, 913	161	3. 3	4, 870	109	2. 2
Nevada	2, 040	30	1. 5	1, 184	20	1. 7	856	10	1. 2
Colorado	3, 578	1, 215	34. 0	1, 873	498	26. 6	1, 705	717	42. 1
Arizona	890	496	55. 7	448	242	5. 4	442	254	5. 8
Washington	1, 796	78	4. 3	952	44	4. 7	844	34	4. 0
Idaho	591	28	4. 7	289	9	3. 1	302	19	6. 3
Utah	9, 501	952	10. 0	4, 673	523	11. 2	4, 828	429	8. 9
Montana	921	58	6. 3	585	29	5. 0	336	29	8. 6
Dakota	1, 077	91	8. 4	562	44	7. 8	515	47	9. 1
Wyoming	538	28	5. 2	332	14	4. 2	206	14	6. 8
New Mexico	11, 866	9, 690	81. 7	5, 282	3, 956	74. 9	6, 584	5, 734	87. 1
Pacific Division	84, 321	14, 954	17. 7	43, 415	6, 719	15. 8	41, 906	8, 235	19. 7
Grand total	4, 240, 002	417, 111	9. 8	2, 067, 144	207, 578	10. 0	2, 172, 858	209, 533	9. 7

TABLE 26.—*The illiteracy of white persons* 15 *to* 20 *years old in* 1880.

States and Territories.	White persons 15 to 20 years of age, both inclusive.			White males 15 to 20 years of age, both inclusive.			White females 15 to 20 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	76, 848	3, 342	4. 3	37, 898	1, 789	4. 7	38, 950	1, 553	4. 0
New Hampshire	39, 283	2, 281	5. 8	19, 127	1, 127	5. 9	20, 156	1, 154	5. 7
Vermont	38, 203	1, 599	4. 2	19, 134	943	4. 9	19, 069	656	3. 4
Massachusetts	205, 162	7, 038	3. 4	97, 256	3, 319	3. 4	107, 906	3, 719	3. 4
Rhode Island	31, 049	2, 811	9. 1	14, 705	1, 400	9. 5	16, 344	1, 411	8. 6
Connecticut	70, 645	2, 151	3. 0	34, 436	1, 051	3. 1	36, 209	1, 100	3. 0
New York	595, 600	13, 973	2. 3	281, 106	6, 954	2. 5	314, 494	7, 019	2. 2
New Jersey	131, 080	3, 217	2. 5	63, 206	1, 785	2. 8	67, 874	1, 432	2. 1
Pennsylvania	512, 709	16, 327	3. 2	249, 344	8, 901	3. 6	263, 365	7, 426	2. 8
Ohio	392, 752	10, 409	2. 7	192, 080	5, 930	3. 1	200, 672	4, 479	2. 2
Michigan	195, 412	5, 517	2. 8	99, 033	3, 459	3. 5	96, 379	2, 058	2. 1
Indiana	259, 124	10, 081	3. 9	128, 226	5, 650	4. 4	130, 898	4, 431	3. 4
Wisconsin	171, 375	4, 284	2. 5	84, 796	2, 243	2. 6	86, 579	2, 041	2. 4
Illinois	394, 785	13, 657	3. 5	195, 115	7, 619	3. 9	199, 670	6, 038	3. 0
Minnesota	97, 206	2, 544	2. 6	49, 317	1, 402	2. 8	47, 889	1, 142	2. 4
Iowa	210, 208	3, 471	1. 7	106, 373	2, 091	2. 0	103, 835	1, 380	1. 3
Nebraska	49, 669	960	1. 9	25, 831	536	2. 1	23, 838	424	1. 8
Kansas	110, 756	2, 352	2. 1	57, 230	1, 430	2. 5	53, 526	922	1. 7
Northern Division	3, 581, 866	106, 014	2. 9	1, 754, 213	57, 629	3. 2	1, 827, 653	48, 385	2. 6
Delaware	15, 401	867	5. 6	7, 554	448	5. 9	7, 847	419	5. 3
Maryland	90, 258	4, 613	5. 1	43, 364	2, 503	5. 8	46, 894	2, 110	4. 5
District of Columbia	13, 521	188	1. 4	6, 001	100	1. 7	7, 520	88	1. 2
Virginia	101, 412	16, 594	16. 4	49, 505	8, 944	18. 1	51, 907	7, 650	14. 7
West Virginia	72, 246	9, 986	13. 8	35, 908	5, 152	14. 3	36, 338	4, 834	13. 3
Kentucky	176, 525	34, 216	19. 4	87, 312	17, 954	20. 6	89, 213	16, 262	18. 2
North Carolina	103, 927	30, 271	29. 1	51, 308	15, 052	29. 3	52, 619	15, 219	28. 9
Tennessee	141, 064	36, 177	25. 6	69, 703	18, 468	26. 5	71, 361	17, 709	24. 8
South Carolina	44, 988	10, 114	22. 5	21, 803	5, 212	23. 9	23, 185	4, 902	21. 1
Georgia	96, 856	21, 269	22. 0	46, 712	10, 827	23. 2	50, 144	10, 442	20. 8
Alabama	79, 999	19, 805	24. 8	38, 501	10, 117	26. 3	41, 498	9, 688	23. 3
Florida	16, 396	3, 297	20. 1	7, 951	1, 755	22. 1	8, 445	1, 542	18. 3
Mississippi	56, 369	8, 799	15. 6	27, 602	4, 828	17. 5	28, 767	3, 971	13. 8
Missouri	261, 781	21, 706	8. 3	129, 153	11, 991	9. 3	132, 628	9, 715	7. 3
Arkansas	67, 311	16, 639	24. 7	33, 586	8, 524	25. 4	33, 725	8, 115	24. 1
Louisiana	53, 673	9, 775	18. 2	25, 100	4, 959	19. 8	28, 573	4, 816	16. 9
Texas	135, 429	19, 088	14. 1	68, 086	10, 731	15. 8	67, 343	8, 357	12. 4
Southern Division	1, 527, 156	263, 404	17. 2	749, 149	137, 565	18. 3	778, 007	125, 839	16. 2
California	86, 665	1, 948	2. 2	43, 299	1, 221	2. 8	43, 366	727	1. 7
Oregon	19, 039	327	1. 7	9, 820	218	2. 2	9, 219	109	1. 2
Nevada	3, 915	71	1. 8	2, 081	61	2. 9	1, 834	10	0. 5
Colorado	17, 299	1, 306	7. 5	10, 285	573	5. 6	7, 014	733	10. 5
Arizona	3, 188	723	22. 7	1, 795	403	22. 6	1, 393	320	22. 9
Washington	6, 700	88	1. 3	3, 471	59	1. 7	3, 229	29	0. 9
Idaho	2, 728	82	3. 0	1, 508	58	3. 8	1, 220	24	2. 0
Utah	17, 460	848	4. 9	8, 590	498	5. 8	8, 870	350	3. 9
Montana	2, 615	51	2. 0	1, 587	35	2. 2	1, 028	16	1. 6
Dakota	12, 238	330	2. 7	6, 503	175	2. 7	5, 735	155	2. 7
Wyoming	1, 695	31	1. 8	993	25	2. 5	702	6	0. 9
New Mexico	13, 103	8, 200	62. 6	6, 379	3, 324	52. 1	6, 724	4, 876	72. 5
Pacific Division	186, 645	14, 005	7. 5	96, 311	6, 650	6. 9	90, 334	7, 355	8. 1
Grand total	5, 295, 667	383, 423	7. 2	2, 599, 673	201, 844	7. 7	2, 695, 994	181, 579	6. 7

TABLE 27.—*The illiteracy of white adults in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	White persons 21 years of age and upward.			White males 21 years of age and upward.			White females 21 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
	*		*	*	*	*	*	*	*
Maine	342, 740	13, 291	3. 3	169, 194	6, 516	3. 9	173, 546	6, 775	3. 9
New Hampshire	189, 830	7, 586	4. 0	90, 840	3, 361	3. 7	98, 990	4, 225	4. 3
Vermont	182, 586	13, 312	7. 3	90, 524	6, 867	7. 6	92, 062	6, 445	7. 0
Massachusetts	829, 495	83, 812	10. 1	394, 047	30, 920	7. 8	435, 448	52, 890	12. 1
Rhode Island	121, 217	16, 072	13. 3	57, 312	5, 922	10. 3	63, 905	10, 152	15. 9
Connecticut	302, 566	22, 673	7. 5	147, 659	8, 990	6. 1	154, 907	13, 683	8. 2
New York	2, 325, 130	189, 952	8. 2	1, 146, 004	71, 208	6. 4	1, 179, 126	116, 744	9. 9
New Jersey	453, 380	36, 431	8. 0	223, 984	14, 515	6. 5	229, 396	21, 916	9. 6
Pennsylvania	1, 698, 109	177, 611	10. 5	848, 790	61, 350	7. 2	849, 319	116, 261	13. 6
Ohio	1, 243, 143	109, 888	8. 8	625, 253	41, 439	6. 6	617, 890	68, 449	11. 1
Michigan	580, 896	35, 529	6. 1	311, 718	17, 543	5. 6	269, 178	17, 986	6. 7
Indiana	739, 670	93, 982	12. 7	382, 081	36, 331	9. 5	357, 589	57, 651	16. 1
Wisconsin	478, 521	40, 307	8. 4	254, 262	17, 637	6. 9	224, 259	22, 670	10. 1
Illinois	1, 157, 220	97, 658	8. 4	617, 567	40, 801	6. 6	539, 653	56, 857	10. 5
Minnesota	201, 475	18, 150	9. 0	114, 344	8, 041	7. 0	87, 131	10, 109	11. 6
Iowa	532, 957	34, 607	6. 5	289, 179	14, 782	5. 1	243, 778	19, 825	8. 1
Nebraska	61, 681	2, 125	3. 4	38, 784	956	2. 5	22, 897	1, 169	5. 1
Kansas	167, 234	12, 169	7. 3	101, 489	5, 994	5. 9	65, 745	6, 175	9. 4
Northern Division	11, 607, 850	1, 005, 155	8. 7	5, 903, 031	395, 173	6. 7	5, 704, 819	609, 982	10. 7
Delaware	49, 996	8, 032	16. 1	24, 811	3, 466	14. 0	25, 185	4, 566	18. 1
Maryland	296, 173	32, 766	11. 1	145, 622	13, 344	9. 2	150, 551	19, 422	12. 9
District of Columbia	47, 089	3, 756	8. 0	23, 178	1, 214	5. 2	23, 911	2, 542	10. 6
Virginia	340, 316	67, 997	20. 0	161, 500	27, 646	17. 1	178, 816	40, 351	22. 5
West Virginia	182, 831	39, 726	21. 7	91, 345	15, 181	16. 6	91, 486	24, 545	25. 7
Kentucky	481, 647	106, 551	22. 1	245, 138	43, 826	17. 9	236, 509	62, 725	26. 5
North Carolina	310, 001	95, 839	30. 9	139, 535	33, 111	23. 7	170, 466	62, 728	36. 8
Tennessee	408, 550	106, 538	26. 1	199, 056	37, 713	18. 9	209, 494	68, 825	32. 9
South Carolina	133, 806	30, 391	22. 7	62, 547	12, 490	20. 0	71, 259	17, 901	25. 1
Georgia	278, 534	62, 430	22. 4	129, 665	21, 899	16. 9	148, 869	40, 531	27. 2
Alabama	223, 897	48, 430	21. 6	105, 474	17, 429	16. 5	118, 423	31, 001	26. 2
Florida	41, 225	9, 476	23. 0	21, 065	3, 876	18. 8	20, 160	5, 600	27. 8
Mississippi	166, 044	23, 103	13. 9	84, 784	9, 357	11. 0	81, 260	13, 746	16. 9
Missouri	710, 467	84, 904	11. 9	384, 324	34, 780	9. 0	326, 143	50, 124	15. 4
Arkansas	148, 561	35, 380	23. 8	77, 195	13, 610	17. 6	71, 366	21, 770	30. 5
Louisiana	167, 993	27, 588	16. 4	87, 066	12, 048	14. 0	80, 927	15, 540	19. 2
Texas	241, 350	37, 350	15. 5	132, 390	17, 505	13. 2	108, 960	19, 845	18. 2
Southern Division	4, 228, 480	820, 257	19. 4	2, 114, 695	318, 495	15. 1	2, 113, 785	501, 762	23. 7
California	281, 230	22, 199	7. 9	186, 823	12, 362	6. 6	94, 407	9, 837	10. 4
Oregon	39, 711	2, 181	5. 5	25, 641	1, 085	4. 2	14, 070	1, 096	7. 8
Nevada	29, 285	600	2. 0	24, 266	474	1. 1	5, 019	126	2. 5
Colorado	22, 937	4, 379	19. 1	16, 087	2, 305	14. 3	6, 850	2, 074	30. 3
Arizona	6, 673	1, 934	29. 0	5, 311	1, 167	22. 0	1, 362	767	56. 3
Washington	11, 824	616	5. 2	8, 773	437	5. 0	3, 051	179	5. 9
Idaho	7, 681	422	5. 5	6, 504	315	4. 8	1, 177	107	9. 1
Utah	34, 760	3, 317	9. 5	17, 655	1, 137	6. 4	17, 105	2, 180	12. 8
Montana	14, 259	480	3. 4	12, 551	399	3. 2	1, 708	81	4. 7
Dakota	7, 551	709	9. 3	5, 496	403	7. 3	2, 055	306	14. 9
Wyoming	6, 904	412	6. 0	5, 908	326	5. 5	996	86	8. 6
New Mexico	42, 262	32, 027	75. 8	23, 177	14, 892	64. 3	19, 085	17, 135	89. 8
Pacific Division	505, 077	69, 276	13. 7	338, 192	35, 302	10. 4	166, 885	33, 974	20. 4
Grand total	16, 341, 407	1, 894, 688	11. 6	8, 355, 918	748, 970	9. 0	7, 985, 489	1, 145, 718	14. 4

TABLE 28.—*The illiteracy of white adults in* 1880.

States and Territories.	White persons 21 years of age and upward.			White males 21 years of age and upward.			White females 21 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	376, 382	16, 234	4. 3	186, 659	8, 420	4. 5	189, 723	7, 814	4. 1
New Hampshire	215, 706	10, 694	5. 0	104, 901	5, 264	5. 0	110, 805	5, 430	4. 9
Vermont	191, 593	12, 872	6. 7	95, 307	6, 731	7. 1	96, 286	6, 141	6. 4
Massachusetts	1, 051, 684	81, 671	7. 8	496, 692	30, 951	6. 2	554, 992	50, 720	9. 1
Rhode Island	158, 522	18, 611	11. 7	75, 012	7, 157	9. 5	83, 510	11, 454	13. 7
Connecticut	358, 679	23, 339	6. 5	173, 759	9, 501	5. 5	184, 920	13, 838	7. 5
New York	2, 826, 859	182, 050	6. 4	1, 388, 692	76, 745	5. 5	1, 438, 167	105, 305	7. 3
New Jersey	587, 736	37, 348	6. 4	289, 965	15, 902	5. 5	297, 771	21, 446	7. 2
Pennsylvania	2, 151, 246	174, 286	8. 1	1, 070, 392	65, 985	6. 2	1, 080, 854	108, 301	10. 0
Ohio	1, 588, 507	92, 616	5. 8	804, 871	40, 373	5. 0	783, 636	52, 243	6. 7
Michigan	848, 590	48, 291	5. 7	461, 557	26, 330	5. 7	387, 033	21, 961	5. 7
Indiana	941, 763	77, 076	8. 2	487, 698	33, 757	6. 9	454, 065	43, 319	9. 5
Wisconsin	637, 221	45, 798	7. 2	338, 932	21, 221	6. 3	298, 289	24, 577	8. 2
Illinois	1, 481, 945	99, 356	6. 7	783, 161	44, 536	5. 7	698, 784	54, 820	7. 8
Minnesota	372, 591	27, 645	7. 4	212, 399	12, 372	5. 8	160, 192	15, 273	9. 5
Iowa	768, 677	35, 815	4. 7	413, 633	16, 202	3. 9	355, 044	19, 613	5. 5
Nebraska	216, 924	7, 821	3. 6	128, 198	3, 836	3. 0	88, 726	3, 985	4. 5
Kansas	447, 526	17, 095	3. 8	254, 949	7, 998	3. 1	192, 577	9, 097	4. 7
Northern Division	15, 222, 151	1, 008, 618	6. 6	7, 746, 777	433, 281	5. 6	7, 455, 374	575, 337	7. 7
Delaware	63, 032	6, 462	10. 3	31, 902	2, 955	9. 3	31, 130	3, 507	11. 3
Maryland	371, 698	34, 155	9. 2	183, 522	15, 152	8. 3	188, 176	19, 003	10. 1
District of Columbia	65, 681	3, 569	5. 4	31, 955	1, 350	4. 2	33, 726	2, 219	6. 6
Virginia	425, 224	71, 004	16. 7	206, 248	31, 474	15. 3	218, 976	39, 530	18. 1
West Virginia	261, 681	45, 340	17. 3	132, 777	19, 055	14. 4	128, 904	26, 285	20. 4
Kentucky	623, 438	124, 723	20. 0	317, 579	54, 956	17. 3	305, 859	69, 767	22. 8
North Carolina	405, 082	116, 437	28. 7	189, 732	44, 420	23. 4	215, 350	72, 017	33. 4
Tennessee	507, 413	118, 734	23. 4	250, 055	46, 948	18. 8	257, 358	71, 786	27. 9
South Carolina	182, 518	34, 335	18. 8	86, 900	13, 924	16. 0	95 618	20, 411	21. 3
Georgia	370, 984	71, 693	19. 3	177, 967	28, 571	16. 1	193, 017	43, 122	22. 3
Alabama	294, 941	60, 174	20. 4	141, 461	24, 450	17. 3	153, 480	35, 724	23. 3
Florida	65, 713	10, 885	16. 6	34, 210	4, 706	13. 8	31, 503	6, 179	19. 6
Mississippi	214, 122	27, 789	13. 0	108, 254	12, 473	11. 5	105, 868	15, 316	14. 5
Missouri	940, 668	89, 924	9. 6	508, 165	40, 655	8. 0	432, 503	49, 269	11. 4
Arkansas	254, 461	50, 225	19. 7	136, 150	21, 349	15. 7	118, 311	28, 886	24. 4
Louisiana	213, 172	34, 813	16. 3	108, 810	16, 377	15. 1	104, 362	18, 436	17. 7
Texas	534, 783	65, 117	12. 2	301, 737	33, 085	11. 0	233, 046	32, 032	13. 7
Southern Division	5, 794, 611	965, 389	16. 6	2, 867, 424	411, 900	14. 3	2, 847, 187	553, 489	19. 4
California	424, 636	22, 625	5. 3	262, 583	12, 615	4. 8	162, 053	10, 010	6. 2
Oregon	81, 826	2, 904	3. 5	51, 636	1, 669	3. 2	30, 190	1, 235	4. 1
Nevada	34, 952	1, 807	5. 2	25, 633	1, 173	4. 6	9, 319	634	6. 8
Colorado	125, 131	7, 025	5. 6	92, 088	3, 627	3. 9	33, 043	3, 398	10. 3
Arizona	23, 125	3, 550	15. 4	18, 046	2, 150	11. 9	5, 079	1, 400	27. 6
Washington	35, 614	1, 011	2. 8	24, 251	642	2. 6	11, 363	369	3. 2
Idaho	16, 023	510	3. 2	11, 669	319	2. 7	4, 354	191	4. 4
Utah	60, 681	5, 385	8. 9	32, 078	2, 137	6. 7	28, 603	3, 248	11. 4
Montana	24, 311	525	2. 2	19, 636	410	2. 1	4, 675	115	2. 5
Dakota	74, 629	3, 206	4. 3	50, 962	1, 678	3. 3	23, 667	1, 528	6. 5
Wyoming	12, 327	285	2. 3	9, 241	160	1. 7	3, 086	125	4. 1
New Mexico	54, 185	33, 623	62. 1	30, 981	14, 898	48. 1	23, 204	18, 725	80. 7
Pacific Division	967, 440	82, 456	8. 6	628, 804	41, 478	6. 6	338, 636	40, 978	12. 1
Grand total	21, 984, 202	2, 056, 463	9. 4	11, 343, 000	886, 659	7. 8	10, 641, 197	1, 169, 804	11. 0

Table 29.—*The illiteracy of colored persons* 10 *to* 14 *years old in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Colored persons 10 to 14 years of age, both inclusive.			Colored males 10 to 14 years of age, both inclusive.			Colored females 10 to 14 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
	*	*	*	*	*	*	*	*	*
Maine	221	18	8.1	135	14	10.4	86	4	4.7
New Hampshire	60	7	11.7	36	4	11.1	24	3	12.3
Vermont	92	6	6.5	52	3	5.8	40	3	7.5
Massachusetts	1,222	62	5.1	595	32	5.6	627	30	4.8
Rhode Island	451	47	10.4	225	26	11.1	226	21	9.3
Connecticut	968	133	13.7	473	69	14.6	495	64	12.9
New York	5,034	747	14.8	2,454	375	15.3	2,580	372	14.4
New Jersey	3,460	875	25.3	1,779	432	24.3	1,681	443	26.4
Pennsylvania	6,965	851	12.2	3,348	401	12.0	3,617	450	12.4
Ohio	7,053	2,394	31.3	3,925	1,276	32.5	3,728	1,118	30.0
Michigan	2,067	505	28.8	1,041	202	28.0	1,026	303	29.5
Indiana	3,047	711	23.3	1,546	356	23.0	1,501	355	23.7
Wisconsin	346	54	15.6	184	36	19.6	162	18	11.1
Illinois	3,191	660	20.7	1,586	335	21.1	1,605	325	20.2
Minnesota	173	72	41.6	92	38	41.3	81	34	42.0
Iowa	627	70	11.2	305	32	10.5	322	38	11.8
Nebraska	92	33	36.0	41	20	48.8	51	13	25.5
Kansas	2,349	674	28.7	1,157	350	30.2	1,192	324	27.2
Northern Division	38,018	8,009	21.1	18,974	4,091	21.6	19,044	3,918	20.6
Delaware	2,918	1,785	61.2	1,501	925	61.6	1,417	860	60.7
Maryland	22,575	13,645	60.5	11,494	7,143	62.1	11,081	6,502	58.7
District of Columbia	4,807	2,132	44.4	2,233	972	43.5	2,574	1,160	45.5
Virginia	69,376	57,448	82.8	35,324	29,728	81.3	34,052	27,720	81.1
West Virginia	2,390	1,665	69.6	1,217	861	70.7	1,173	804	68.5
Kentucky	31,998	24,974	78.0	16,281	12,896	79.2	15,717	12,078	76.8
North Carolina	54,666	41,125	75.2	28,251	21,398	75.7	26,415	19,727	74.7
Tennessee	45,693	31,635	69.2	23,188	16,409	70.8	22,505	15,226	67.7
South Carolina	55,338	40,814	73.8	28,354	20,894	73.3	26,984	19,920	73.8
Georgia	74,497	64,621	86.8	38,161	33,366	87.4	36,336	31,255	86.0
Alabama	63,406	47,023	74.2	32,502	24,396	75.1	30,904	22,627	73.2
Florida	12,011	7,703	64.1	6,352	4,190	65.1	5,659	3,513	62.1
Mississippi	59,162	46,741	79.0	30,236	24,108	79.7	28,926	22,633	78.2
Missouri	17,148	10,500	61.2	8,661	5,366	62.0	8,487	5,134	60.5
Arkansas	15,774	10,342	65.6	8,172	5,358	65.6	7,602	4,984	65.6
Louisiana	42,418	33,426	78.8	21,455	17,020	79.8	20,963	16,406	78.3
Texas	34,280	27,717	80.9	17,616	14,342	81.4	16,664	13,375	80.3
Southern Division	608,457	463,296	76.1	310,998	239,372	77.0	297,450	223,924	75.3
California	2,262	369	16.4	1,639	264	16.1	623	105	17.0
Oregon	117	31	26.5	80	18	22.5	37	13	35.1
Nevada	42	2	4.8	33	2	6.1	9	0	......
Colorado	60	28	46.7	29	13	44.8	31	15	48.4
Arizona	7	3	42.9	3	1	33.3	4	2	50.0
Washington	132	19	14.4	65	10	15.4	67	9	13.4
Idaho	33	28	84.8	29	28	96.6	4	0	......
Utah	53	16	30.2	35	13	37.4	18	3	16.7
Montana	24	12	50.0	14	7	50.0	10	5	50.5
Dakota	162	139	85.8	84	65	77.4	78	74	94.0
Wyoming	11	4	36.5	3	1	33.3	8	3	37.5
New Mexico	350	295	84.3	174	145	83.3	176	150	85.2
Pacific Division	3,253	946	29.1	2,188	567	25.9	1,065	379	35.3
Grand total	649,728	472,251	72.7	332,160	244,030	73.5	317,568	228,221	71.7

TABLE 30.—*The illiteracy of colored persons* 10 *to* 14 *years old in* 1880.

States and Territories.	Colored persons 10 to 14 years of age, both inclusive.			Colored males 10 to 14 years of age, both inclusive.			Colored females 10 to 14 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	190	27	14.2	96	11	11.5	94	16	17.0
New Hampshire	64	4	6.3	28	3	10.7	36	1	2.8
Vermont	134	12	9.0	71	6	8.5	63	6	9.5
Massachusetts	1,504	31	2.1	765	18	2.4	739	13	1.8
Rhode Island	531	49	9.2	258	25	9.7	273	24	8.8
Connecticut	1,006	64	6.4	481	31	6.4	525	33	6.3
New York	5,464	528	9.7	2,678	273	10.2	2,786	255	9.2
New Jersey	3,855	686	17.8	1,921	361	18.8	1,934	325	16.8
Pennsylvania	8,094	1,155	14.3	3,962	600	15.1	4,132	555	13.4
Ohio	9,164	925	10.1	4,648	489	10.5	4,516	436	9.7
Michigan	2,454	439	17.9	1,251	244	19.8	1,223	195	15.9
Indiana	4,469	699	15.6	2,223	352	15.8	2,246	347	15.4
Wisconsin	710	152	21.4	378	87	23.0	332	65	19.6
Illinois	5,203	1,389	26.7	2,651	736	27.8	2,552	653	25.6
Minnesota	396	127	32.1	197	73	37.1	199	54	27.1
Iowa	1,121	123	11.0	584	58	9.9	537	65	12.1
Nebraska	252	40	15.9	119	17	14.3	133	23	17.3
Kansas	5,625	1,638	29.1	2,883	889	30.5	2,742	749	27.3
Northern Division	50,236	8,088	16.1	25,174	4,273	16.9	25,062	3,815	15.2
Delaware	3,075	1,453	47.3	1,572	754	48.0	1,503	699	46.5
Maryland	24,603	11,086	45.1	12,289	5,693	46.3	12,314	5,393	43.8
District of Columbia	5,735	853	14.9	2,717	430	15.8	3,018	423	14.0
Virginia	83,209	53,843	64.7	42,204	28,109	66.6	41,005	25,734	62.8
West Virginia	3,195	1,324	41.4	1,691	727	43.0	1,504	597	39.7
Kentucky	34,068	21,370	62.7	17,255	11,326	65.6	16,813	10,044	59.7
North Carolina	68,493	51,889	75.8	34,775	26,676	76.7	33,718	25,213	74.8
Tennessee	52,817	35,419	67.1	26,617	18,280	68.7	26,200	17,139	65.4
South Carolina	76,981	57,072	74.1	39,323	29,314	74.5	37,658	27,758	73.7
Georgia	94,522	73,930	78.2	48,496	38,222	78.8	46,026	35,708	77.6
Alabama	77,036	57,905	75.2	39,626	30,153	76.1	37,410	27,752	74.2
Florida	15,947	10,676	66.9	8,085	5,425	67.1	7,862	5,251	66.8
Mississippi	84,238	58,806	69.8	43,231	30,366	70.2	41,007	28,440	69.4
Missouri	18,030	7,823	43.4	9,101	4,169	45.8	8,929	3,654	40.9
Arkansas	25,815	18,658	72.3	13,230	9,605	72.6	12,585	9,053	71.9
Louisiana	57,914	41,919	72.4	29,586	21,603	73.0	28,328	20,316	71.7
Texas	52,055	37,384	71.8	26,259	19,165	73.0	25,796	18,219	70.6
Southern Division	777,733	541,410	69.6	396,057	280,017	70.7	381,676	261,393	68.5
California	2,875	1,199	41.7	1,638	613	37.4	1,237	586	47.4
Oregon	367	142	38.7	229	94	41.0	138	48	34.8
Nevada	322	148	46.0	187	79	42.2	135	69	51.1
Colorado	181	20	11.0	89	13	14.6	92	7	7.6
Arizona	457	149	32.6	238	66	27.7	219	83	37.9
Washington	662	247	37.3	365	135	37.0	297	112	37.7
Idaho	45	14	31.1	28	8	28.6	17	6	35.3
Utah	123	58	47.2	60	33	55.0	63	25	39.7
Montana	268	138	51.5	144	86	59.7	124	52	41.9
Dakota	203	103	50.7	94	49	52.1	109	54	49.5
Wyoming	27	10	37.0	15	6	40.0	12	4	33.3
New Mexico	1,156	1,045	90.4	591	525	88.8	565	520	92.0
Pacific Division	6,686	3,273	48.8	3,678	1,707	46.4	3,008	1,566	52.0
Grand total	834,655	552,771	66.2	424,909	285,997	67.3	409,746	266,774	65.1

TABLE 31.—*The illiteracy of colored persons* 15 *to* 20 *years old in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Colored persons 15 to 20 years of age, both inclusive.			Colored males 15 to 20 years of age, both inclusive.			Colored females 15 to 20 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
	*	*	*	*	*	*	*	*	*
Maine	347	32	9. 2	197	18	9. 1	150	14	9. 3
New Hampshire	121	18	14. 9	76	10	13. 2	45	8	17. 8
Vermont	175	29	16. 6	93	17	18. 3	82	12	14. 6
Massachusetts	2, 014	228	11. 3	882	79	9. 0	1, 132	149	13. 1
Rhode Island	672	115	17. 1	318	64	20. 1	354	51	14. 4
Connecticut	1, 377	217	15. 8	635	85	13. 4	742	132	17. 8
New York	7, 059	1, 225	17. 3	3, 331	599	18. 0	3, 728	626	16. 8
New Jersey	4, 121	1, 033	25. 1	1, 996	482	24. 1	2, 125	551	25. 9
Pennsylvania	8, 836	1, 815	20. 5	3, 927	719	18. 3	4, 909	1, 096	22. 3
Ohio	8, 836	2, 774	30. 8	4, 282	1, 375	32. 1	4, 554	1, 399	30. 7
Michigan	2, 315	650	28. 1	1, 125	321	28. 5	1, 190	329	27. 7
Indiana	3, 436	1, 212	35. 3	1, 656	553	33. 4	1, 780	659	36. 5
Wisconsin	511	79	15. 5	283	43	15. 2	228	36	15. 8
Illinois	3, 891	1, 239	31. 8	1, 955	620	31. 7	1, 936	619	32. 0
Minnesota	221	66	29. 9	131	43	32. 8	90	23	25. 5
Iowa	842	146	17. 3	454	71	15. 6	388	75	19. 3
Nebraska	132	41	31. 1	58	18	31. 1	74	23	31. 1
Kansas	2, 344	978	41. 7	1, 089	459	42. 1	1, 255	519	41. 4
Northern Division	47, 250	11, 897	25. 2	22, 488	5, 576	24. 8	24, 762	6, 321	25. 6
Delaware	3, 171	2, 065	65. 1	1, 635	1, 054	64. 5	1, 536	1, 011	65. 8
Maryland	23, 229	15, 353	66. 1	10, 779	7, 075	65. 6	12, 450	8, 278	66. 5
District of Columbia	5, 831	3, 355	57. 5	2, 112	1, 117	52. 7	3, 719	2, 238	60. 2
Virginia	66, 810	57, 228	85. 5	30, 067	26, 170	87. 0	36, 743	31, 058	84. 5
West Virginia	2, 448	1, 704	69. 6	1, 210	844	69. 8	1, 238	860	69. 5
Kentucky	30, 749	24, 935	81. 1	14, 706	12, 158	82. 7	16, 043	12, 777	79. 6
North Carolina	55, 384	44, 957	81. 2	26, 212	21, 404	81. 7	29, 172	23, 553	80. 7
Tennessee	45, 344	35, 135	77. 5	20, 996	16, 300	77. 6	24, 348	18, 835	77. 4
South Carolina	56, 378	45, 612	80. 9	25, 531	20, 331	79. 6	30, 847	25, 281	82. 0
Georgia	73, 516	66, 110	89. 9	34, 922	31, 295	89. 6	38, 594	34, 815	90. 2
Alabama	62, 952	54, 537	86. 6	29, 239	25, 618	87. 6	33, 713	28, 919	85. 8
Florida	12, 340	10, 333	83. 7	5, 857	4, 957	84. 6	6, 483	5, 376	82. 9
Mississippi	59, 056	50, 163	84. 9	27, 461	23, 252	84. 7	31, 595	26, 911	85. 2
Missouri	16, 758	11, 544	68. 9	7, 844	5, 357	68. 3	8, 914	6, 187	69. 4
Arkansas	17, 086	12, 520	73. 3	8, 044	5, 865	72. 9	9, 042	6, 655	73. 6
Louisiana	43, 604	35, 666	81. 8	19, 435	15, 906	81. 8	24, 169	19, 760	81. 3
Texas	32, 577	28, 142	86. 4	14, 987	13, 086	87. 3	17, 590	15, 056	85. 6
Southern Division	607, 233	499, 359	82. 2	281, 037	231, 789	82. 5	326, 196	267, 570	82. 0
California	9, 546	1, 025	10. 7	7, 760	647	8. 4	1, 786	378	21. 2
Oregon	495	73	14. 5	438	51	11. 6	57	22	38. 6
Nevada	479	26	5. 4	362	22	6. 1	117	4	3. 4
Colorado	119	68	57. 1	61	31	50. 8	58	37	63. 8
Arizona	8	6	75. 0	4	2	50. 0	4	4	100. 0
Washington	278	110	39. 6	115	18	15. 7	163	92	56. 4
Idaho	372	315	84. 7	348	298	85. 7	24	17	70. 8
Utah	182	74	40. 7	132	60	45. 5	50	14	28. 0
Montana	146	41	28. 1	96	19	19. 8	50	22	44. 0
Dakota	194	139	71. 7	89	61	68. 5	105	78	74. 3
Wyoming	87	26	29. 9	68	20	29. 4	19	6	31. 6
New Mexico	367	315	85. 8	138	117	84. 8	229	198	86. 5
Pacific Division	12, 273	2, 218	18. 1	9, 611	1, 346	14. 0	2, 662	872	32. 8
Grand total	666, 756	513, 474	77. 0	313, 136	238, 711	76. 2	353, 620	274, 763	78. 0

TABLE 32.—*The illiteracy of colored persons 15 to 20 years old in 1880.*

States and Territories.	Colored persons 15 to 20 years of age, both inclusive.			Colored males 15 to 20 years of age, both inclusive.			Colored females 15 to 20 years of age, both inclusive.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	230	50	21.7	117	18	15.4	113	32	28.3
New Hampshire	82	9	11.0	37	6	16.2	45	3	6.7
Vermont	132	15	11.4	60	10	16.7	72	5	6.9
Massachusetts	1,886	70	3.7	847	37	4.4	1,039	33	3.2
Rhode Island	551	61	11.1	246	32	13.0	305	29	9.5
Connecticut	1,278	100	7.8	641	45	7.0	637	55	8.6
New York	7,013	763	10.9	3,083	367	11.9	3,930	396	10.1
New Jersey	4,430	670	15.1	2,075	292	14.1	2,355	378	16.1
Pennsylvania	9,691	1,327	13.7	4,162	525	12.6	5,529	802	14.5
Ohio	9,735	1,279	13.1	4,639	691	14.9	5,096	588	11.5
Michigan	2,909	594	20.4	1,370	298	21.8	1,539	296	19.2
Indiana	4,837	858	17.7	2,274	411	18.1	2,563	447	17.4
Wisconsin	712	192	27.0	359	106	29.5	353	86	24.4
Illinois	5,307	1,185	22.3	2,559	598	23.4	2,748	587	21.4
Minnesota	453	144	31.8	222	76	34.2	231	68	29.4
Iowa	1,229	191	15.5	651	112	17.2	578	79	13.7
Nebraska	283	66	23.3	124	27	21.8	159	39	24.5
Kansas	5,236	1,452	27.7	2,490	728	29.2	2,746	724	26.4
Northern Division	55,994	9,026	16.1	25,956	4,379	16.5	30,038	4,647	15.4
Delaware	3,512	1,680	47.8	1,819	863	47.4	1,693	817	48.3
Maryland	26,568	12,729	47.9	12,423	6,155	49.5	14,145	6,574	46.5
District of Columbia	6,523	1,490	22.8	2,490	519	20.8	4,033	971	24.1
Virginia	77,629	47,477	61.2	37,024	23,629	63.8	40,605	23,848	58.7
West Virginia	3,352	1,276	38.1	1,728	666	38.5	1,624	610	37.6
Kentucky	35,806	21,787	60.8	17,250	11,092	64.3	18,556	10,695	57.6
North Carolina	67,003	45,902	68.5	32,678	22,174	67.9	34,325	23,728	69.1
Tennessee	51,730	32,137	62.1	24,930	15,808	63.4	26,800	16,329	60.9
South Carolina	73,640	52,936	71.9	34,465	24,105	69.9	39,175	28,831	73.6
Georgia	91,920	70,234	76.4	43,709	33,185	75.9	48,211	37,049	76.8
Alabama	75,947	56,897	74.9	35,928	26,673	74.2	40,019	30,224	75.5
Florida	15,669	9,991	63.8	7,032	4,392	62.5	8,637	5,599	64.8
Mississippi	78,415	52,825	67.4	36,502	24,167	66.2	41,913	28,658	68.4
Missouri	20,042	8,064	40.2	9,561	4,077	42.6	10,481	3,987	38.0
Arkansas	23,466	16,371	69.8	11,143	7,596	68.2	12,323	8,775	71.2
Louisiana	52,072	38,721	74.4	23,536	17,476	74.3	28,536	21,245	74.4
Texas	48,141	33,309	69.2	22,572	15,635	69.3	25,569	17,674	69.1
Southern Division	751,435	503,826	67.0	354,790	238,212	69.6	396,645	265,614	66.9
California	13,763	4,041	29.4	11,764	2,860	24.3	1,999	1,181	59.1
Oregon	2,065	551	26.7	1,893	481	25.4	172	70	40.7
Nevada	1,096	368	33.6	825	236	28.6	271	132	48.7
Colorado	441	83	18.8	271	58	21.4	170	25	14.7
Arizona	756	236	31.2	539	136	25.2	217	100	46.1
Washington	1,236	329	26.6	928	191	20.6	308	138	44.8
Idaho	191	37	19.4	182	30	16.5	9	7	77.8
Utah	237	113	47.7	157	60	38.2	80	53	66.2
Montana	354	161	45.5	225	83	36.9	129	78	60.5
Dakota	213	103	48.4	103	52	50.5	110	51	46.4
Wyoming	134	28	20.9	108	23	21.3	26	5	19.2
New Mexico	1,402	1,305	93.1	736	667	90.6	666	638	95.8
Pacific Division	21,888	7,355	33.6	17,731	4,877	27.5	4,157	2,478	59.6
Grand total	829,317	520,207	62.7	398,477	247,468	62.1	430,840	272,739	63.3

Table 33.—*The illiteracy of colored adults in* 1870.

[Columns marked with an * were computed in the United States Bureau of Education.]

States and Territories.	Colored persons of 21 years of age and upward. Enumerated. No.	Colored persons: Returned as unable to write. No.	Colored persons: Returned as unable to write. Per cent.	Colored males of 21 years of age and upward. Enumerated. No.	Colored males: Returned as unable to write. No.	Colored males: Returned as unable to write. Per cent.	Colored females of 21 years of age and upward. Enumerated. No.	Colored females: Returned as unable to write. No.	Colored females: Returned as unable to write. Per cent.
	*	*	*	*	*	*	*	*	*
Maine	1,151	128	11.1	629	69	11.0	522	59	11.3
New Hampshire	341	70	20.5	182	38	20.9	159	32	20.1
Vermont	491	87	17.7	284	47	16.5	207	40	19.3
Massachusetts	8,440	1,876	22.2	4,126	826	20.0	4,314	1,050	24.3
Rhode Island	3,149	728	23.1	1,440	296	20.6	1,709	432	25.3
Connecticut	5,747	1,353	23.5	2,756	634	23.0	2,991	719	24.0
New York	30,668	8,875	29.0	14,737	3,952	26.8	15,931	4,923	30.9
New Jersey	16,134	6,393	39.0	7,879	2,882	36.6	8,255	3,511	42.5
Pennsylvania	35,664	13,232	37.1	17,093	5,760	33.7	18,571	7,472	40.2
Ohio	30,391	15,621	51.4	15,649	7,535	48.1	14,742	8,086	54.9
Michigan	7,858	3,233	41.1	4,226	1,532	36.2	3,632	1,701	46.8
Indiana	11,661	6,440	55.2	6,161	3,212	52.1	5,500	3,228	58.7
Wisconsin	1,666	463	27.8	897	244	27.2	769	219	28.5
Illinois	14,349	8,061	56.2	7,706	3,974	51.6	6,643	4,087	61.5
Minnesota	756	334	44.2	395	154	39.0	361	180	49.9
Iowa	2,792	1,310	46.9	1,556	635	40.8	1,236	675	54.6
Nebraska	479	157	32.8	298	96	32.2	181	61	33.7
Kansas	8,091	5,920	73.2	4,191	2,900	69.2	3,900	3,020	77.4
Northern Division	179,828	74,281	41.3	90,205	34,786	38.6	89,623	39,495	44.1
Delaware	10,481	7,970	76.0	5,224	3,765	72.1	5,257	4,205	80.0
Maryland	81,904	59,709	72.9	39,123	27,125	69.3	42,781	32,584	76.2
District of Columbia	23,195	18,356	79.1	10,151	7,599	74.9	13,044	10,757	82.5
Virginia	226,438	207,679	91.3	107,742	97,946	90.9	118,696	109,733	92.4
West Virginia	8,067	6,628	82.2	3,972	3,186	80.2	4,095	3,442	84.1
Kentucky	93,736	81,190	86.6	44,338	37,895	85.5	49,398	43,295	87.6
North Carolina	162,447	145,211	89.6	78,278	68,805	87.9	84,169	76,406	90.8
Tennessee	134,445	119,200	88.3	64,144	55,944	87.2	70,301	63,256	89.8
South Carolina	178,253	148,786	83.5	85,505	70,841	82.9	92,748	77,945	84.0
Georgia	225,198	212,923	94.1	107,975	100,556	93.1	117,223	112,367	95.9
Alabama	202,477	189,393	93.5	97,841	91,033	93.0	104,636	98,360	94.0
Florida	38,397	34,863	90.8	18,844	16,811	89.2	19,553	18,052	92.3
Mississippi	186,856	168,378	90.1	90,191	80,927	89.7	96,665	87,451	90.5
Missouri	49,487	38,604	78.0	23,892	18,008	74.1	25,595	20,596	80.5
Arkansas	52,389	46,382	88.5	26,888	23,685	88.1	25,501	22,697	89.0
Louisiana	176,337	156,317	88.6	87,121	76,772	88.1	89,216	79,545	89.2
Texas	103,108	94,949	92.1	51,704	47,314	91.5	51,404	47,635	92.7
Southern Division	1,953,215	1,736,538	88.9	942,933	828,212	87.8	1,010,282	908,326	89.9
California	46,143	4,164	9.0	40,862	2,899	7.1	5,281	1,265	24.0
Oregon	3,227	912	28.3	2,976	800	26.8	251	112	44.6
Nevada	2,959	191	6.5	2,675	176	6.6	284	15	5.3
Colorado	351	163	46.4	211	70	33.2	140	93	66.4
Arizona	52	15	28.8	42	10	23.8	10	5	50.0
Washington	1,051	355	33.8	510	85	14.7	541	270	49.9
Idaho	3,945	2,559	64.9	3,819	2,481	65.0	126	78	61.9
Utah	452	176	38.9	388	159	41.0	64	17	26.6
Montana	2,075	222	10.6	1,879	150	8.0	196	72	36.7
Dakota	518	371	71.6	228	153	67.1	290	218	75.2
Wyoming	252	91	36.1	199	57	28.6	53	34	64.1
New Mexico	523	470	89.9	156	139	89.1	367	331	90.2
Pacific Division	61,548	9,659	15.7	53,945	7,179	13.3	7,603	2,510	33.1
Grand total	2,194,591	1,820,508	83.0	1,087,083	870,177	80.0	1,107,508	950,331	85.8

TABLE 34.—*The illiteracy of colored adults in 1880.*

States and Territories.	Colored persons of 21 years of age and upward.			Colored males of 21 years of age and upward.			Colored females of 21 years of age and upward.		
	Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.		Enumerated.	Returned as unable to write.	
	No.	No.	Per cent.	No.	No.	Per cent.	No.	No.	Per cent.
Maine	1, 238	335	27. 1	664	144	21. 7	574	191	33. 3
New Hampshire	448	81	18. 1	237	42	17. 7	211	39	18. 5
Vermont	541	129	23. 8	314	82	26. 1	227	47	20. 7
Massachusetts	12, 026	2, 221	18. 5	5, 956	941	15. 8	6, 070	1, 280	21. 1
Rhode Island	4, 221	1, 139	27. 0	1, 886	467	24. 8	2, 335	672	28. 8
Connecticut	7, 239	1, 497	20. 7	3, 5[illegible]2	696	19. 7	3, 707	801	21. 6
New York	41, 348	10, 134	24. 5	20, 059	4, 521	22. 5	21, 289	5, 613	26. 4
New Jersey	21, 921	7, 844	35. 8	10, 670	3, 560	33. 4	11, 251	4, 284	38. 1
Pennsylvania	48, 869	15, 551	31. 8	23, 892	6, 845	28. 6	24, 977	8, 706	34. 9
Ohio	40, 940	14, 152	34. 6	21, 706	7, 041	32. 4	19, 234	7, 111	37. 0
Michigan	11, 417	3, 758	32. 9	6, 130	1, 852	30. 2	5, 287	1, 906	36. 1
Indiana	19, 834	8, 806	44. 4	10, 739	4, 345	40. 5	9, 095	4, 461	49. 0
Wisconsin	2, 857	981	34. 3	1, 550	474	30. 6	1, 307	507	38. 8
Illinois	24, 327	10, 397	42. 7	13, 686	5, 271	38. 5	10, 641	5, 126	48. 2
Minnesota	1, 945	769	39. 5	1, 086	364	33. 5	859	405	47. 1
Iowa	5, 228	1, 958	37. 5	3, 025	1, 009	33. 4	2, 203	949	43. 1
Nebraska	1, 424	496	34. 8	844	256	30. 3	580	240	41. 4
Kansas	20, 315	11, 498	56. 6	10, 765	5, 623	52. 2	9, 550	5, 875	61. 5
Northern Division	266, 138	91, 746	31. 9	136, 741	43, 533	31. 8	129, 397	48, 213	38. 0
Delaware	12, 658	7, 935	62. 7	6, 396	3, 787	59. 2	6, 262	4, 148	66. 2
Maryland	100, 107	66, 357	66. 3	48, 584	30, 873	63. 5	51, 523	35, 484	68. 9
District of Columbia	32, 777	19, 447	59. 3	13, 918	7, 520	54. 0	18, 859	11, 927	63. 2
Virginia	267, 612	214, 340	80. 1	128, 257	100, 210	78. 1	139, 355	114, 130	81. 9
West Virginia	11, 899	7, 539	63. 4	6, 384	3, 830	60. 0	5, 515	3, 709	67. 3
Kentucky	120, 349	90, 738	75. 4	58, 642	43, 177	73. 6	61, 707	47, 561	77. 1
North Carolina	215, 649	174, 152	80. 8	105, 018	80, 282	76. 4	110, 631	93, 870	84. 8
Tennessee	166, 839	126, 939	76. 1	80, 250	58, 601	73. 0	86, 589	68, 338	78. 9
South Carolina	244, 129	200, 063	81. 9	118, 889	93, 010	78. 2	125, 240	107, 053	85. 5
Georgia	293, 421	247, 318	84. 3	143, 471	116, 516	81. 2	149, 950	130, 802	87. 2
Alabama	246, 075	206, 878	84. 1	118, 423	96, 408	81. 4	127, 652	110, 470	86. 5
Florida	53, 897	39, 753	73. 8	27, 489	19, 110	69. 5	26, 408	20, 643	78. 2
Mississippi	262, 744	208, 122	79. 2	130, 278	99, 068	76. 0	132, 466	109, 054	82. 3
Missouri	66, 321	40, 357	60. 9	33, 042	19, 028	57. 6	33, 279	21, 329	64. 1
Arkansas	88, 690	68, 444	77. 2	46, 827	34, 300	73. 2	41, 863	34, 144	81. 6
Louisiana	218, 167	178, 789	82. 0	107, 977	86, 555	80. 2	110, 190	92, 234	83. 7
Texas	155, 069	121, 827	78. 6	78, 639	59, 669	75. 9	76, 430	62, 158	81. 3
Southern Division	2, 556, 403	2, 018, 998	78. 9	1, 252, 484	951, 944	76. 0	1, 303, 919	1, 067, 054	81. 8
California	75, 189	22, 100	29. 4	66, 809	16, 857	25. 2	8, 380	5, 243	62. 6
Oregon	8, 651	2, 387	27. 6	7, 993	2, 005	25. 1	658	382	58. 1
Nevada	6, 653	1, 638	24. 6	5, 622	1, 194	21. 2	1, 031	444	43. 1
Colorado	2, 142	465	21. 7	1, 520	289	19. 0	622	176	28. 3
Arizona	3, 075	633	20. 6	2, 352	422	17. 9	723	211	29. 2
Washington	4, 553	1, 884	41. 4	3, 419	1, 126	32. 9	1, 134	758	66. 8
Idaho	3, 288	943	28. 7	3, 126	869	27. 8	162	74	45. 7
Utah	958	518	54. 1	695	356	51. 2	263	162	61. 6
Montana	2, 381	777	32. 6	1, 908	483	25. 3	473	294	62. 2
Dakota	1, 085	458	42. 2	641	210	32. 8	444	248	55. 9
Wyoming	1, 078	144	13. 4	939	84	8. 9	139	60	43. 2
New Mexico	5, 641	5, 209	92. 3	3, 095	2, 779	89. 8	2, 546	2, 430	95. 4
Pacific Division	114, 694	37, 156	33. 2	98, 119	26, 674	27. 3	16, 575	10, 482	62. 6
Grand total	2, 937, 235	2, 147, 900	73. 1	1, 487, 344	1, 022, 151	68. 7	1, 449, 891	1, 125, 749	77. 6

APPENDIX.

NATIONAL AID TO EDUCATION.

No attempt has been made in the preceding pages to enforce the lessons suggested by figures so fundamental in their relations to the future of our liberties; but, as illustrating some of their bearings, the following extracts are appended from addresses by Hon. J. L. M. Curry, LL. D., the very able, judicious, and efficient general agent of the Peabody education fund.

The first address, entitled "National peril and remedy," was delivered at Louisville, Ky., in September, 1883, before the Inter-State Educational Convention. Dr. Curry spoke as follows:

It is a fact of some interest that this Inter-State Educational Convention meets not very far from the centre of the population of the United States. It must be the earnest desire of all here assembled that influences for good may be set in motion which shall spread to the extreme limits of the Union.

Another auspicious circumstance is that we meet in Kentucky. In 1811 Stein, the great German statesman, the forerunner of Bismarck, said, while meditating a plan of emigration to America: "To enjoy rest and independence it would be best to settle in America, in Kentucky or Tennessee; there one would find a splendid climate and soil, glorious rivers, and rest and security for a century — not to mention a multitude of Germans. The capital of Kentucky is called Frankfurt." Seventy-two years ago the great German, with his prescience, did not dream of what our eyes see to-day. In the light of subsequent events America would have presented other attractions than gifts of nature and furnished themes for profounder contemplation in her rapid growth of population, increasing 12,000,000 in ten years; in her enormous productive industries; in her fabulous applications of science; in her startling powers of recuperation; in her complex governments; in her vast and unparalleled agencies for education. For crushed and Bonaparte-ridden Germany he saw clearly that the only hope was education. Frederick William, after the bitter humiliation Prussia suffered, said: "Though territory, power, and prestige be lost, they can be regained by acquiring intellectual and moral power," and the general education subsequently secured to the people reversed, in the wars against Austria and France, the abasement of the Napoleonic period. It is the prime business and duty of each generation to educate the next. No legislation in the United States is more important than that which pertains to the universal education of our citizens. In the convention which framed the Constitution, Wilson, the most learned civilian of the body, said: "Property is not the sole nor primary end of government and of society; the improvement of the human mind is the most noble object." President Garfield said: "Next in importance to freedom and justice is popular education, without which neither justice nor freedom can be permanently maintained."

This convention emphasizes the importance of education by giving especial prominence to the subject of aid from the General Government. Federal aid is reducible to a few very simple propositions, each of which is capable of indefinite illustration and argument:

(1) The basis of free institutions is the intelligence and integrity of the citizen. This foundation is not simply indispensable to good government, but to the permanence and success of our Republic. Washington, in his farewell address, said: "In

proportion as the structure of a government gives force to public opinion, it is essential that public opinion should be enlightened." Madison said: "It is universally admitted that a well instructed people alone can be permanently a free people." All our wisest patriots confirm the declarations of these two men, who were most influential in bringing about the Union and framing the Constitution. The "democratic ideal is that the many shall govern themselves." Self government by the many is impossible, if the many be ignorant. They become dupes and slaves of the crafty few. The best government is that which governs least. The good and enlightened are a law unto themselves. "The maximum of education," says a profound thinker in Georgia, "is the minimum of government." The minimum of education is the maximum of restraint, interference, coercion. In a popular government an educated people is the best constitution. The more universally the people are educated, the greater the liberty which can be allowed. "The world is governed too much" is an old adage. The best limitation of government is right education. It secures a better selection of rulers, better watchfulness of agents, and is the best check on oppression, on corruption, on unwise and class legislation. Ignorance and despotism are always in partnership.

General intelligence reduces the need of harsh and external government; makes protection of person and property easier, surer, and more economical; gives readier mastery over narrowness and prejudice, the fruitful source of so much legislative wrong; and substitutes the teacher for the sheriff, the workshop for the poorhouse, the school-house for the prison. "For every pound that you save in education," said Macaulay, "you will spend five in prosecutions, in prisons, in penal settlements."

(2) Universal education, even approximately, is impossible except through governmental direction and public revenues. "The best educated communities on the globe are those where governmental direction, in matters of education, is most constant and careful." There is no instance of an unenlightened people becoming cultured by spontaneous efforts or of general education through private or denominational agencies. Italy, Spain, and Austria show the inadequacy or insufficiency of parochial or sectarian schools. Prior to the war the wealth of the people of the South was greater per capita (slaves being excluded from the enumeration) and pauperism was less than in any country in the world. Flourishing academies and colleges existed, superior advantages for the elect few, both men and women, abounded; but there was no adequate provision for universal education, and of consequence there was deplorable illiteracy among the white people.

The census of 1860 showed in South Carolina 15,792 adult natives (omitting slaves) who could not read and write; in Georgia, 43,550; in Alabama, 37,302; in Mississippi, 15,136; in North Carolina, 74,877; in Virginia, 83,300; in Tennessee, 69,262; in Kentucky, 65,740; in Missouri, 51,173. Every intelligent southern man knows that these figures largely underestimate the illiteracy. Governor Campbell, of Virginia, in his message in 1839, stated that "almost one-quarter part of the men applying for marriage licenses are unable to write their names."

Primarily it is the duty of local communities and of States, by local and general taxation, to furnish education for all youth. The education of the children of a state is properly a burden on property and is the cheapest defence of the property and the lives of citizens. Industrial success, productive industry, accumulation of capital, remunerative wages, national independence, national well-being, cannot be separated from general education. In the United States there is an annual expenditure of over $83,000,000 for public schools. In the late slave States there is a school enrolment of about 3,000,000 in a school population of nearly 6,000,000, and for the education of those enrolled these States expended over $13,000,000. These dry figures mark a a revolution of which few realize the import and extent. Every Southern State has now a system of public schools. The same educational rights and privileges are granted to both races. School money is distributed without discrimination betwixt African and Caucasian. Right manfully, heroically, did the South undertake the work

of rehabilitation and adjustment to new environments. The history of our country, fertile in great deeds, presents few spectacles of civic virtue, of self sacrificing and patient courage, grander and sublimer. A thoughtful and observing New Englander says: "No similar class of people in the Old or the New World has accomplished so much, in a time so short, against obstacles so formidable." Upon "the slough of financial wreck and absolute poverty," amid the untold harassments and horrors of reconstruction, with irritations that no stranger can conceive of, the school systems were erected. Most commendable progress has been made in legalizing and popularizing a new system, establishing schools, building and beautifying school-houses, improving methods of teaching, and in training teachers.

Despite these patriotic efforts illiteracy abounds fearfully. Of the school population of the South, nearly half are not in school. The whites of educational age, under nineteen, not enrolled, number 1,719,723; the colored, 1,126,815. Nearly one-half of the white children and more than one-half of the colored are growing up without educational advantages.

(3) The resources of the South are wholly inadequate to meet the heavy burden which is upon her. In her present financial condition, universal education, without Federal aid, is distant—is impossible. In the most advanced and prosperous countries schools and their management are not upon a satisfactory basis. Governor Butler is reported as saying that even in Massachusetts 92 per cent. of the children receive no education after they attain the age of fifteen years. On an average, our people do not get more than thirty months' schooling. This is true in highly prosperous localities; but the Southern States are poor. I am no pessimist nor alarmist. The progress in mining and in manufactures has been great, but agriculture and tillage and common roads are not in a flattering condition. Excluding Delaware, Maryland, and Missouri, the assessed valuation of property in the remaining Southern States diminished between 1860 and 1880 $2,432,730,524. The State of New York is said to be worth in taxable property as much as all the Southern States. Ignorant labor dooms to poverty. It is idle to be drawing roseate pictures of the "new South" until the laboring classes are far ahead in intelligence and skill of present attainments. The loss from stupid or unskilled labor would educate a hundred times over every child in the South. With her sparse population, with means not half what they were in ante bellum days, with double the number of children to be educated, it is impossible for the South, by any tax short of confiscation, to provide education for the children within her borders.

It is well to open our eyes to stubborn, irremovable facts and confront the perils growing out of them. Reference has been made to the alarming fact that in the late slave-holding States and in the District of Columbia there is a non-attendance of 1,719,723 white children and of 1,126,815 negro children. That may be prospective peril, but its fearfulness may be estimated if we consider that the South had in 1870 4,189,972 illiterates and in 1880 4,741,173, an increase of over one-half a million, in spite of the educational activities of the intermediate ten years. The total number of illiterates of voting age in the slave-holding States in 1870 was 1,146,707; in 1880, 1,363,844, an increase of illiterate voters of 217,137. The total number of males of voting age in the South in 1880 was 4,119,908, and of these 1,363,844 were illiterate. Thirty-three and one-tenth per cent. of the voters in the South are illiterate. Of the illiterates 69.8 per cent. are colored and 30.2 per cent. whites. It is specially significant that these figures show an increase of illiterate voters in the last decade.

If my first postulate be true, that education is fundamental to the right discharge of the duties and functions of American citizenship, may I not, in homely language, ask our governors What are you going to do about this illiteracy and consequent peril? The life of the Republic is one desperate and prolonged struggle against ignorance, and the States are impotent in the encounter.

Of the pervasive and vicious effects of ignorant suffrage it is not easy to make a calculation. Through demagogues, "bosses," corrupt schemers, a vote, the symbol of

freedom, becomes the instrument of caprice, or revenge, or bribery. The ballot box ceases to be the registry of intelligent convictions or unselfish patriotism. General corruption will spread itself through all degrees in the State: justice will be sold in the tribunals; separation of departments in the Government will cease, each prostituted to the low purpose of personal revenge or partisan success; voters, making money of their liberty, will transfer their loyalty to where it will turn to most advantage, and offices will become spoils for the adventurous and the unworthy.

Ours was designed to be a representative government. Representatives are not mere deputies. A representative is to think for his constituency, to give them the benefit of intelligence, patriotism, profound study of the Constitution, and political economy and statecraft. He is to enrich his mind by observation, travel, study of history, diplomacy, and biography, to discipline his powers by thorough training, and thus fit himself for his responsible duties.

Ignorant suffrage reverses all this, and puts in public councils the weak, vacillating, ill informed, corrupt. Fidelity to principle, courageous adherence to convictions, broad culture, ripe judgment, sage experience, will be of little worth; and the voice of the rabble becomes the interpreter of laws, the decider of contracts, the moulder of policy. The principle of inter-citizenship is, I believe, peculiar to our confederation. A citizen of one State is a citizen of every other State. Combine with this the far reaching results of the elective franchise, as affecting directly the election of President and Representatives and indirectly of Senators, and illiteracy assumes darker and broader proportions. An election in the most benighted congressional district concerns every citizen of the Union and every interest dependent on taxation, the currency, or any general legislation. Not merely the South, but the whole Union is imperilled by ignorant and, therefore, controllable suffrage. In view of the inability of the South and of these perilous possibilities, the patriotism of the country makes an appeal to the Government for prompt and adequate relief.

The negroes, who in some of the States are a majority of the population, are poor and pay a very small part of the taxes. The aggregate value of the whole property of colored taxpayers in Georgia was $6,589,876, while the total taxable property was $287,269,403. The comptroller of South Carolina is confident that the white people in the State pay nine-tenths of the taxes. In Wilmington, N. C., the negroes outnumber the whites in about the ratio of eleven to eight. Of about every $12 of the school fund, the whites pay $11 and the negroes $1, and yet of these $12 the negroes get $8.50 and the whites $3.50. In Danville, Va., the city taxes in 1882, exclusive of license tax for corporate uses, were about $40,000, of which $1,206.63 were paid by negroes. In Kentucky, the apportionment of school fund, at the rate of $1.40 per capita, to colored children is $129,458. The taxes, together with all the fines and forfeitures collected from the negroes, are devoted to the education of colored children, and yet there is a deficit in the colored school fund of $92,345.36.

These things are not said to their disparagement. Their poverty is not of their creating. Suffrage in their hands is exceptionally dangerous, because, elated by the suddenness and manner of their liberation, unacquainted with the responsibilities of freedom, crazed by vague and false notions of liberty, they may be easily deluded by bad men.

The illiteracy of the negroes creates an imperative obligation. Unlike other immigrants, they came to America by compulsion, under circumstances of peculiar hardship and cruelty. Their servitude was recognized and guaranteed by State and Federal Constitutions, by international treaties, by congressional legislation, by judicial decisions. The Government of the United States suddenly emancipated the slaves; as suddenly raised them to citizenship and made them voters. They possessed no property to make them conservative, no habits nor traditions of self government, no education to qualify them for the duties and privileges of freemen and citizens. Cunningly and systematically misled and inflamed, they have become the tools of demagogues and the prey of the wicked. Manumission and enfranchisement create an

obligation on the part of the Federal Government to fit them for the temptations and responsibilities of citizenship, and save them and our institutions from the perils of ill understood liberty and ignorant and reckless use of the franchise. Negroes are free, but as the distinguished Commissioner of Education (than whom no American is doing more for the cause of popular enlightenment) has tersely said: "The slavery of ignorance remains."

Negroes are the wards of the nation. Philanthropy, humanity, party success, and fanaticism all wonderfully combine for their elevation and education. There are, however, thousands of illiterate men and women of our own race, our own kith and kin, for whom our special sympathies are awakened and who make no appeal to partisan or sectarian selfishness. The danger of illiteracy of the black voters is perhaps no greater than the danger of illiterate white voters. The consequence of illiteracy of white women may be more alarming, because more far reaching. Whatever is said about the elevation of "our brother in black" appeals to my heart and judgment and has my ready coöperation, but the white people are in peril, too. Slavery is abolished, God be praised: but the negro remains in the South in the closest contact with the Caucasian, and putting aside all questions of ethnology, of comparative capability, he is a blind simpleton or a madman who does not see, and tremble while he sees, that the presence on the same soil of two populous and distinct races, ineffaceably marked by opposite colors, with centuries of traditions and habits behind each not easily forgotten or adjusted, is a problem and a peril that statesmen, philosophers, and philanthropists seem not to have begun to study. Superadd to race prejudice and chasm producing traditions deep poverty; derangement of labor system; slow and painful adaptation to a different, even if a better, civilization; the current of immigration flowing anywhere rather than to the South, notwithstanding the genial climate, pure and abundant water, superior healthfulness, cheap and productive lands, exhaustless and varied mineral products—and the patriot and the Christian may well have his whole being stirred to the profoundest depths when he seeks to penetrate the dark future and interrogate as to the destiny of his home and his people. Often deeply concerned fathers and mothers ask me "What of the night?" I can only answer, Do what lies nearest in the light of duty and conscience and the Scriptures and leave results to God. If any safe solution there is it must be in the school-house and church-house, in education and in the gospel of Jesus Christ, bearing in mind that the object of education is not so much the imparting of knowledge as the developing of power and the building up of inward strength of character. Education is no catholicon, any more than freedom is; it does not cure social and political ills. It must be supplemented by and allied to the uplifting, renovating, regenerating power of the Christian religion.

When the illiteracy of both races, adults and minors, men and women, is combined we have a stimulus for effort that cannot be surpassed. The measure lies outside of party politics. The magnitude and imminence of the peril should awaken torpid patriotism into vigorous activity, should call forth "a fresh flow of consciousness," should stir lassitude into zeal. A perilous exigency is upon us. The Republic is in a death struggle with ignorance. If this menace and strain were during war, pendente lite, interposition and relief would come promptly and without dissent. Is self preservation less an obligation in peace than in war? To preserve the life of society is the first duty. A government is bound to protect its own existence against any enemy that may assail it. Such a mass of illiteracy as we have is worse than foreign invasion, incites domestic violence, gives supremacy to bad passions and appetites, and is a perpetual menace to the life and well-being of republican institutions. Of the constitutionality of Federal aid there is hardly a peg to hang a doubt upon. Those who emancipated, citizenized, and enfranchised the negroes, to whom belongs exclusively the honor of that sublime and eventful act, are estopped from denying the legality or the expediency of making good the act of freedom. In the history, the laws, and the institutions of the United States, from the earliest period of our nationality down to the present time, there is an unbroken line of precedents com-

mitting the Government to the policy and sanctioning in fullest measure the principle of aid to education. Since 1785, the Government, beginning before the present Federal Union was formed, has given 79,000,000 acres of the public domain to public schools, colleges, and universities. Before the grant of 1862 in aid of agricultural and mechanical schools, the old States and Maine, Vermont, Kentucky, and Tennessee had not received an acre of the public lands. Under the stimulus of this Federal aid, the States which were not cursed with African slavery established vigorous systems of free schools and prosperous universities. If example has ever ripened into custom and custom into law, if a course of uninterrupted observance ever matures into prescription, then Federal aid is res adjudicata.

In giving this aid some general principles should control:

(1) It should be based on illiteracy and not on population. Illiteracy creates the danger and the obligation and justifies the exercise of the power.

(2) It should be adequate, continued for ten years, and decrease annually after the second or third year, so as not to beget a sense and habit of dependence, and so that at the expiration of the term of years, when the aid is withdrawn, the States will be able to carry on the school systems in improved efficiency.

(3) The aid, at furthest after the second year, should be contingent upon the contribution by State and local revenues of an equal amount. The Peabody trust has found the principle of helping those who help themselves to be stimulating and invaluable.

(4) State systems of education should not be superseded but judiciously supplemented. The States must establish and control the schools, rely mainly on themselves, and accept Federal aid as temporary, meeting a present exigency. The object is to help public schools in the States, so that the systems, trained to superior efficiency, can live and prosper when Federal aid ceases. The strain upon centralized official machinery is already too great, and there is no need to enhance the centripetal tendencies of the General Government or to minify the influence and authority of the States.

(5) The aid should be mainly given for primary instruction, allowing a fraction for training of teachers.

(6) In the apportionment and disbursement, some Federal direction and oversight cannot be objectionable.

In the United States we are liable to underrate perils and to ridicule crises because of the extent and efficacy of modifying causes. Bad legislation, inefficient civil service, corrupt administration, departure from sound economics, and a partisan judiciary are somewhat controlled and their evil consequences somewhat nullified by the extent of our territory, the fertility of soil, the boundlessness and productiveness of resources, the stimulating influence of free institutions, and the dynamic energy of intellectual, civil, and religious liberty.

Some of these counteracting and healthful causes are temporary. The patriot and the statesman must look beyond the present, the accidental, the extraordinary, and provide for the ordinary course of human affairs. When these unusual agencies cease, we shall bemoan our folly if we shall have failed to apply the sure remedy.

The Federal Government, in coöperation with the States, using the school machinery now in esse, can so appropriate money as to stimulate State appropriation and enable the States to meet successfully the problem of illiteracy, which now exceeds their pecuniary ability. Now there is a plethoric treasury. Besides the $550,000,000 of tax on consumption (see North American Review, June, 1883), there is an annual Federal tax of $400,000,000. Fifteen or twenty million dollars of this a year, for ten or fifteen years, could not be expended more wisely than upon free schools.

Some nations have strong and dangerous neighbors and rivals. Self preservation seems to require of them the maintenance of armies which, while furnishing the means of repelling external assaults, constitute a heavy drain on the productive industries of the population. Geography, or peculiarity of situation, determines their

policy and forbids freedom and spontaneity of action. With our expanse of territory, with no rivals on our frontiers, our self protection finds its sphere and duty in guarding against internal foes. We need school-houses rather than frowning forts, pupils rather than soldiers, an educated citizenship rather than armed battalions.

We are fortunately free from all treaties in reference to balance of power, all controversies as to succession, all negotiation as to royal alliances, all disputes as to adjustment of boundaries, all uneasiness as to disparity in armies and navies. The obligations to be safe and the precautions for security make European governments dangerous to subjects and formidable to neighbors. The strength to protect or resist begets the desire—tempts—to encroach, to use power selfishly and aggressively. Ability to resist external foes is acquired at the expense and to the detriment of the people, and, as history shows, is almost always fatal to personal rights and popular liberty.

What is needful to save us from the perils of illiteracy, instead of being dangerous to the people at home or to nations abroad, will rather be beneficial to both. Our industry, resources, national wealth, commerce, exchanges, will be increased. Power, instead of being centralized, will be diffused. Instead of ignorant, transferable voters, dupes and tools of the wary and corrupt, we shall have intelligent men and women, loving liberty, jealous of arbitrary power, watchful of agents, and capable, by their own sustained and voluntary energy, of protecting and perpetuating our free institutions.

The biographer of Stein developed with minuteness the genesis and value of the idea of nationality as contradistinguished from loyalty to the State and as influencing literature, politics, and sacrifices. To this he traces the remodelling of Italy and Germany and the rearrangement of the east of Europe. From it sprang the revolutions, the patience, persistence, resiliency, unconquerableness, which rescued Central Europe from the conquests of Napoleon. Fichte, in his inquiry for a comprehensive remedy for the evils which, in his time, afflicted Germany, found it in a grand system of national education. In our system of coequal and correlated States, a national system of education is undesirable, as is a national university, and the subordination of State school systems to Federal direction and control is contrary to the genius of our institutions. The separate States are not to be absorbed nor sunk into provincial dependencies. We seek the harmonious blending of the centrifugal and centripetal, liberty and union, local self government and a Federal Government, all preserved in strength and orderly unity.

National aid to State schools will secure the benefits of a national education. A national tie, as distinct from a civic tie, springing from a common origin, from inbred instincts, from a common country, common literature, common struggles and triumphs, common hopes and aspirations, is capable of being formed and strengthened. Herder, Lessing, Wieland, and Goethe, in their zeal for humanitarian cosmopolitanism, may deride patriotism as at the utmost a heroic weakness, but patriotism, love for the whole country, not to be confounded with fidelity to the State, is a potent factor of civilization, an essential element of national greatness and glory. There is a subtle, potential influence, springing from the proud consciousness of belonging to a great and honored country, which evokes manly self respect and generates noblest deeds of daring and chivalry. To be an American is something quite distinct from being a New Yorker or a Kentuckian, and is a "well spring of character" such as exalted the Roman citizen in the days of his country's greatest glory. This broad patriotism can be enkindled or stimulated by a measure of relief which comes in an hour of need, and which shall conduce to the obliteration of sectional prejudices, to the unification of the people, and to the preservation of our free institutions.

On the 5th of February, in response to an invitation from the Committee on Education and Labor of the House of Representatives, Dr. Curry delivered an address, some portions of which, as accurately as can be reproduced from brief notes, are here added:

The question of Federal aid commends itself to your consideration because it is in no sense partisan or sectional, but embraces the whole country, every interest, and every citizen. Nor is it in its influence transitory and ephemeral, but permanent and enduring. Material things pass away; the invisible and spiritual are imperishable.

Four Presidents have urged the measure upon Congress. State legislatures, educational conventions, and the public press have indorsed it. Senate and House committees have reported favorable bills. The trustees of the Peabody education fund have earnestly urged the subject upon Congress. On the 8th of March, 1880, they presented an elaborate memorial on "The vital necessity of national aid for the education of the colored population of the Southern States," which had been prepared by the Hon. A. H. H. Stuart, Chief Justice Waite, and Hon. William M. Evarts. The trustees renewed their petition and instructed me to present it to both houses of Congress. I am honored by such a body in presenting a petition which takes rank among our ablest state papers, and must make my special acknowledgments to this committee for inviting me to address them on a question so far reaching and important. It is well to lift ourselves at times into a pure atmosphere and to fix our thoughts upon what is grand and noble, what concerns all the people: our free Government, the national life, and humanity.

* * * * * * *

I present a table drawn from the Report of the Commissioner of Education, which should awaken serious thought:

ILLITERACY OF MINORS TEN TO FOURTEEN YEARS OF AGE, INCLUSIVE.

	White.	Colored.
Northern group of States	115,322	8,088
Southern group of States	448,146	541,410
Pacific group of States	15,726	3,273
	579,194	552,771

ILLITERACY OF MINORS FIFTEEN TO TWENTY YEARS OF AGE, INCLUSIVE.

	White.	Colored.
Northern group of States	106,014	9,026
Southern group of States	263,404	503,826
Pacific group of States	14,005	7,355
	383,423	520,207
Percentage of illiteracy in total population 10 to 14	11.8	66.2
Percentage of illiteracy in total population 15 to 20	7.2	62.7
Surplus of colored illiteracy		55.5
Legal white school population in the late slave States		3,954,600
Enrolled		2,234,877
Colored school population		1,929,187
Enrolled		802,372
Not enrolled for instruction		2,846,538

What the South has done for free education is marvellous. The revolution in law and in public opinion is almost incredible, when we consider how "hard it is to overcome habits and prejudices of the past, to change institutions under the pressure of defeat and humiliation." A system of public schools, modelled largely on the systems of the North, has been established in every State, and the school money is distributed per capita betwixt the races. In 1880 the Southern States expended $12,500,000 for public schools. From 1871 to 1883, inclusive, Virginia has paid out in connection with her public schools, $12,798,212. Mr. Mayo, one of the editors of the New-England Journal of Education, who has travelled much in the South and is a thoughtful

observer, says: "No similar class of people in the Old or New World has accomplished so much, in a time so short, against obstacles so formidable."

The South is unable to meet the heavy burden of educating all the children within her limits. Few persons comprehend her financial condition. Slavery sparsified population, prevented the diffusion of wealth, and concentrated labor and capital on one or two kinds of agricultural interest. "A small superior class virtually monopolized property." Then came the war aud emancipation and bankruptcy. On this financial wreck and absolute poverty, the people, with sublime courage, began to build anew their fortunes and institutions. The progress has necessarily been slow. The assessed valuation of property in 1860 in the South, excluding Kentucky, Missouri, and Maryland, was $4,414,610,120; in 1870, $2,303,306,735; and in 1880, $2,179,712,728. The value of real and personal property in New York and New Jersey exceeds the value of similar property in the whole South. Superadd to this financial embarrassment the burden of universal education. As the ability was lessened, the number to be educated was increased. A comparison of adults with minors in some of the Northern and Southern States furnishes a striking argument in favor of national aid. In one hundred inhabitants, New York and Massachusetts had fifty-seven adults and forty-three minors, while Mississippi, Alabama, Arkansas, and South Carolina had forty-three adults and fifty-seven minors. "Even if the wealth of the contrasted States per adult capita were the same, the adults of Mississippi, &c., would be more heavily taxed than those of Massachusetts and New York in furnishing equal opportunities for education to all the population of school age."—(Report of the Commissioner of Education for 1881.)

Ignorant suffrage is an evil demanding prompt and effective remedy. There are 1.908,810 male illiterates over 21 years of age, enough to reverse elections in all but five States of the Union. In South Carolina, Alabama, Georgia, Louisiana, and North Carolina more than half the voters are illiterates. In 1870 the illiterate voters of the South were 1,137,303; in 1880, 1,354,974. This mass of ignorant voters excites most fearful apprehensions, for the degradation of the franchise will lower necessarily the character of the representative.

Mr. Lincoln condensed the theory of the government in the expression that it was a government of the people, for the people, and by the people. "The State is the people themselves, and the laws which control us, which protect us, and which regulate all our civil relations are self imposed rules, the expressions of the free will of the people." With us there are no divine right of kings, no separation into political classes, no places distinguished by caste, no superior privileges of the better born. "Democracy is the supremacy of man over his accidents." Intelligence and integrity of citizens are of the essence of republican institutions. These are basal. So say the fathers and all publicists. In monarchical and aristocratic governments, which do not depend directly on the people, there are many protective and conservative agencies. The royal family, the aristocracy, the established religion, the privileged orders, are all so many buttresses against popular passions and prejudices, against riots and communism. We rely on love of country and institutions, on individual will and personal independence, which are the offspring of intelligent convictions, of instructed understandings. When these are absent, ours becomes the worst government. "Free governments must therefore stand or fall with free schools." And the best service that can be rendered to a country, next to that of giving it liberty, is, as Mr. Madison said, "in diffusing the mental improvement essential to the preservation and enjoyment of the blessing."

Every consideration of self preservation demands a speedy rendering of this aid. In Europe defences are provided against the mad outbreaks of the populace and foreign aggression. Standing armies, repressive and coercive measures, minute and vexatious interferences, limitation of human rights and human liberties, oppressive at home and irritating and dangerous to conterminous powers, are the means for security. Our danger is internal and the remedy is harmful to nothing, to nobody. The edu-

cation furnished increases the productiveness and the value of labor, the self respect of the citizen, develops truest manhood and womanhood, increases individual and national wealth, averts an appalling peril, inures to our good and to the good of the commercial and civilized world.

If one department of the government were in serious jeopardy from external or internal foe, or one substantive clause of the Constitution, or one muniment of liberty, quickly and resolutely would we fly to the rescue. Ignorance of citizens imperils every department of the Government, every clause of the Constitution, every distinctive feature of representative institutions, every prerogative of personal and civil liberty. Ignorance is poverty, is despotism, is slavery. It is not strange then that President Garfield in his inaugural address declared: "All the constitutional power of the nation and of the States and all the volunteer forces of the people should be summoned to meet this danger, by the saving influence of universal education."

In time of war, to save the national life, extreme measures are often resorted to. War is to be deprecated, but it inspires such heroic virtues that hero worshippers we all are instinctively. War develops some noble qualities: it generates patience, self denial, fortitude, courage, chivalry, patriotism. Peace may have perils as imminent and potential as war and justify as well a resort to the extreme medicine of the Constitution. The illiteracy of six million citizens is more perilous than a Confederate army thundering at the gates of the capital. That army was conquered and dissipated in four years. Illiteracy unchecked covers generations. It is a festering cancer, a clinging curse; it begets no noble deeds, it never caused any good; it appeals to base passions and brutal instincts, renders its victims insensible to their degradation, and has in it nothing elevating or deific; it impoverishes and degrades men and nations. We have sanitary commissions to prevent and arrest the spread of yellow fever; we erect levees to guard against overflow of rivers. Ignorance is more hurtful than floods, more destructive than pestilence; it diseases and paralyzes body and soul.

The bulk of the illiteracy, as might have been anticipated, is found among the negroes. Justice to them demands extraordinary measures for their elevation. They are here by compulsion. Enslaved by avarice, they were made free by no agency of their own. The Government emancipated, citizenized, and enfranchised them—three distinct, progressive acts, neither of which is a legal or necessary consequence of the other. As these conditions are the result of national enactment, there is a resulting and imperative obligation to fit these suddenly emancipated and hastily enfranchised citizens for the duties imposed upon them. The welfare of the South, where the negroes live, makes a strong appeal to the liberality of the Government. Certainly the negroes, per se, are not a desirable population. Their original introduction was not of the South's choosing. If any desire to punish the South for clinging with too much tenacity to a system of labor forced upon her, surely the most revengeful may now well cry, "Hold, enough." In the well-being of the South the well-being of the Union is involved. If "one member suffer, all the members suffer with it."

Emancipation was a stupendous act. History records no civil achievement comparable to it in grandeur, in far reaching consequences. Whatever credit is due to the conception or execution of the act is unshared. To the North belong exclusively the honor and the responsibility. The South has no part nor lot in the glory or accountableness. Whether emancipation shall be a blessing or a curse is a fearful question. It will be unspeakably sad if in giving liberty to one race we destroy the free institutions of another. The negro problem is not yet solved; he is a simpleton who thinks that it is. It casts dark, impenetrable shadows on the pathway of the Republic. The ignorance, idleness, immorality, superstition, and semibarbarism which obtain in some localities are appalling.

There is potency in free government. Universal education has in it resources almost infinite. Christianity is the divine remedy for the curable ills of earth. It necessitates, in my judgment, sooner or later, the other two; whether it does or not, the three combined can give us and the negroes deliverance from what is so black and fearful.

We are establishing schools in Alaska. For the Indian we find the school teacher a better civilizer than the soldier. The Indian and Alaskan are remote and few; the negroes are numerous and at our doors. I implore you, as an act of justice to them, for the purity of the ballot box, for the safety of our free representative institutions, to come to the rescue of overburdened States, that have done nobly, but cannot, without confiscation of the property of their citizens, furnish even rudimentary education to the illiterate and helpless masses.

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CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 4—1884.

PROCEEDINGS OF THE DEPARTMENT OF SUPERINTENDENCE OF THE NATIONAL EDUCATIONAL ASSOCIATION AT ITS MEETING AT WASHINGTON, FEBRUARY 12-14, 1884.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

1912—No. 4

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LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, June 13, 1884.

SIR: I have the honor to forward the accompanying report, with the papers presented at the meeting of the Department of Superintendence of the National Educational Association, February 12–14, 1884, and to recommend the same for publication. The meeting was one of the most largely attended ever held. Several of the papers were of an unusually high order, and, together with the discussions, touched questions very prominent in the minds of educators and respecting which the Office is frequently asked for information.

I have the honor to be, very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

Publication approved.

H. M. TELLER,
Secretary.

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NATIONAL EDUCATIONAL ASSOCIATION.

DEPARTMENT OF SUPERINTENDENCE.

PERSONS IN ATTENDANCE.

C. H. Ames, esq., Boston, Mass.

Hon. H. Clay Armstrong, State superintendent of public instruction, Montgomery, Ala.

General S. C. Armstrong, principal Normal and Agricultural Institute, Hampton, Va.

Hon. Samuel A. Baer, superintendent of schools, Reading, Pa.

Hon. Thomas M. Balliet, superintendent of schools of Carbon County, Lehighton, Pa.

Hon. David Beattie, superintendent of schools, Troy, N. Y.

J. N. Beistle, esq., Philadelphia, Pa.

Hon. T. W. Bicknell, LL. D., Boston, Mass.

Maj. Robert Bingham, Bingham School, Orange County, North Carolina.

Prof. James H. Blodgett, Rockford, Ill.

Rev. N. C. Brackett, A. M., Storer College, Harper's Ferry, W. Va.

Hon. Le Roy D. Brown, State school commissioner, Columbus, Ohio.

Hon. Robert K. Buehrle, superintendent of schools, Lancaster, Pa.

Hon. B. L. Butcher, State superintendent of free schools, Wheeling, W. Va.

Rev. J. G. Butler, Washington, D. C.

Appleton P. Clark, esq., trustee public schools, Washington, D. C.

Hon. George F. T. Cook, superintendent of colored schools, Washington, D. C.

Hon. James M. Coughlin, superintendent of schools of Luzerne County, Kingston, Pa.

Hon. Asbury Coward, State superintendent of public instruction, Columbia, S. C.

James Cruikshank, esq., Brooklyn, N. Y.

Hon. J. L. M. Curry, LL. D., general agent Peabody education fund, Richmond, Va.

Mrs. Caroline H. Dall, Washington, D. C.

E. V. De Graff, esq., Washington, D. C.

Hon. J. W. Dickinson, LL. D., secretary State board of education, Boston, Mass.

Hon. J. Aug. Dix, superintendent of schools, Elizabeth, N. J.

John C. Dore, esq., Chicago, Ill.

General John Eaton, United States Commissioner of Education, Washington, D. C.

Hon. Charles G. Edwards, assistant superintendent of schools, Baltimore, Md.

Hon. S. A. Ellis, superintendent of schools, Rochester, N. Y.

Miss Emerson, Brooklyn, N. Y.

A. P. Flint, esq., Philadelphia, Pa.

Hon. L. O. Foose, superintendent of schools, Harrisburg, Pa.

Rev. A. P. Funkhauser, superintendent of schools of Rockingham County, Harrisonburg, Va.

N. P. Gage, esq., supervising principal, Washington, D. C.

William H. Gardiner, esq., chief clerk Bureau of Education, Washington, D. C.

Hon. E. M. Garnett, superintendent of schools, Richmond, Va.

Hon. Herschel R. Gass, State superintendent of public instruction, Lansing, Mich.

Hon. Aaron Gove, superintendent of schools, Denver, Colo.

Hon. J. M. Gregory, LL. D., Civil Service Commission, Washington, D. C.

William T. Harris, LL. D., president Concord School of Philosophy, Concord, Mass.

Hon. J. M. Haworth, United States superintendent of Indian schools, Olathe, Kans.

J. G. Hendrix, esq., Brooklyn, N. Y.

Hon. Charles K. Hetfield, school commissioner of Chemung County, Horseheads, N. Y.

Hon. E. E. Higbee, LL. D., State superintendent of public instruction, Harrisburg, Pa.

Hon. John Hitz, Washington, D. C.

Hon. John W. Holcombe, State superintendent of public instruction, Indianapolis, Ind.

Hon. Henry Houck, deputy State superintendent of public instruction, Harrisburg, Pa.

George A. Howard, esq., Cincinnati, Ohio.

Dr. B. Joy Jeffries, Boston, Mass.

Hon. H. S. Jones, PH. D., superintendent of schools, Erie, Pa.

J. R. Keene, esq., supervising principal of schools, Brightwood, D. C.

Hon. D. L. Kiehle, State superintendent of public instruction, St. Paul, Minn.

George E. Little, esq., Washington, D. C.

B. G. Lovejoy, esq., Washington, D. C.

Hon. George J. Luckey, superintendent of schools, Pittsburgh, Pa.

Hon. James MacAlister, superintendent of schools, Philadelphia, Pa.

Rev. R. McMurdy, D. D., LL. D., Dayton, Ohio.

Hon. A. P. Marble, PH. D., superintendent of schools, Worcester, Mass.

Rev. James Marvin, A. M., D. D., superintendent of industrial school for Indians, Lawrence, Kans.

Prof. L. W. Mason, ex-superintendent of music for the Empire of Japan, Boston, Mass.

Hon. William Milligan, superintendent of schools of Gloucester County, Woodbury, N. J.

H. P. Montgomery, esq., supervising principal of colored schools, Washington, D. C.

W. S. Montgomery, A. M., supervising principal of colored schools, Washington, D. C.

Hon. Charles Morrill, superintendent of schools, Lowell, Mass.

Hon. M. A. Newell, LL. D., State superintendent of public instruction, Baltimore, Md.

Hon. B. G. Northrop, LL. D., ex-secretary State board of education, Clinton, Conn.

Prof. John Ogden, Washington, D. C.

Prof. John M. Ordway, Massachusetts Institute of Technology, Boston, Mass.

Hon. Gustavus J. Orr, LL. D., State school commissioner, Atlanta, Ga.

Prof. C. C. Painter, Great Barrington, Mass.

J. A. M. Passmore, esq., Pottsville, Pa.

Hon. B. F. Patterson, superintendent of schools, Pottsville, Pa.

Hon. Calvin Patterson, superintendent of schools, Brooklyn, N. Y.

Edward A. Paul, esq., principal high school, Washington, D. C.

Prof. W. H. Payne, University of Michigan, Ann Arbor, Mich.

G. A. Plimpton, esq., New York.

Capt. R. H. Pratt, superintendent Indian Training School, Carlisle, Pa.

Hon. J. J. R. Randall, superintendent of schools, Rutland, Vt.

Prof. Z. Richards, Washington, D. C.

Hon. Andrew J. Rickoff, ex-superintendent of schools, Yonkers, N. Y.

Hon. W. O. Rogers, superintendent of schools, New Orleans, La.

Hon. Henry R. Roth, superintendent of schools, Meadville, Pa.

General Daniel Ruggles, superintendent of schools, Fredericksburg, Va.

S. W. Russell, esq., Washington Humane Society, Washington, D. C.

Prof. Albert Salisbury, superintendent of education of American Missionary Association, Atlanta, Ga.

Hon. H. R. Sanford, secretary Department of Superintendence, superintendent of schools, Middletown, N. Y.

Hon. J. C. Scarborough, State superintendent of public instruction, Raleigh, N. C.

Hon. Jos. C. Shattuck, State superintendent of public instruction, Denver, Colo.

Hon. W. H. Shelley, superintendent of schools, York, Pa.

Rev. Alexander Shiras, D. D., Washington, D. C.

Hon. Charles W. Smith, superintendent of schools of Hennepin County, Minneapolis, Minn.

Hon. H. C. Speer, State superintendent of public instruction, Topeka, Kans.

Prof. H. C. Spencer, Spencerian Business College, Washington, D. C.

Hon. George F. Stone, superintendent of schools, Bradford, Pa.

J. M. Stradling, esq., Philadelphia, Pa.

Hon. R. M. Streeter, superintendent of schools, Titusville, Pa.

A. T. Stuart, esq., supervising principal of schools, second district, Washington, D. C.

Prof. A. L. Wade, Morgantown, W. Va.

B. H. Warner, esq., president school board, Washington, D. C.

Hon. W. W. Waterman, superintendent of schools, Taunton, Mass.

Z. F. Westervelt, esq., superintendent Deaf-Mute Institution, Rochester, N. Y.

General E. Whittlesey, secretary Board of Indian Commissioners, Washington, D. C.

Hon. J. P. Wickersham, LL. D., former State superintendent of public instruction of Pennsylvania, Lancaster, Pa.

Hon. Albert S. Willis, member of Congress from Kentucky, Washington, D. C.

Joseph M. Wilson, esq., Washington, D. C.

Hon. J. Ormond Wilson, superintendent of schools, Washington, D. C.

Hon. Henry A. Wise, superintendent of schools, Baltimore, Md.

Prof. George W. Wooley, Washington, D. C.

S. M. Yeatman, esq., Washington, D. C.

PRELIMINARY MEETING — TUESDAY EVENING.

WASHINGTON, *February* 12, 1884.

A preliminary meeting of the members of the Department of Superintendence of the National Educational Association was held in the red parlor of the Ebbitt House at 8 P. M., the president, Hon. B. L. Butcher, in the chair; Hon. H. R. Sanford, secretary and acting treasurer.

The meeting being called to order by the president and declared open for discussion as to the work of the Department, General Eaton moved that a committee of five, with Hon. J. Ormond Wilson as chairman, be appointed by the president to arrange a program for the several sessions. The motion was carried, and the following gentlemen were subsequently appointed: Messrs. Wilson, Bicknell, Gove, Houck, and Orr.

Professor RICHARDS called for minute speeches, and brief and felicitous remarks were made by several of the gentlemen present. Hon. John M. Gregory, LL. D., being called upon, outlined the objects and work of the Civil Service Commission, stated a few of the good results

already obtained, and extended a cordial invitation to all interested in civil service reform to visit the office of the commission and examine into the methods of conducting examinations, &c.

General EATON sketched the progress of supervision of schools in the United States and stated some of the objects of the present meeting of State and county and city superintendents, the foremost of which he believed to be the promotion of some measure of national aid to common schools.

Dr. ORR said that the South is more deeply interested in the question of national aid to education than in any other, the better classes of the citizens being thoroughly in favor of some measure of this kind. His own State legislature had taken action in its behalf three different times, and action had been taken by the legislatures of other States in the South. He believed it of extreme importance that the educators of the country should be united in expressing their views of the measure. No time must be lost. In twenty years the sixteen millions of children now of school age will be the active men and women of the country. Many of the Southern States are doing about as much for education in proportion to the resources at command as the more favored States at the North; but this is not enough, and the aid of the General Government is necessary in meeting the emergency.

Major BINGHAM explained the educational situation of North Carolina and the need of help from outside the State; and Mr. SCARBOROUGH followed with a statement of his views of the importance of national aid, expressing his belief that if this be obtained the most cultured ladies in the State would be glad to become teachers.

Dr. BICKNELL read section 4 of the bill providing aid to education, prepared by the interstate committee.

Mr. WILSON, from the committee on order of exercises, announced the proceedings of the following day, and the meeting then adjourned.

FIRST SESSION — WEDNESDAY MORNING.

WASHINGTON, *February* 13, 1884.

The meeting was called to order by the president, and was opened with prayer by Rev. Dr. R. MCMURDY, of Dayton, Ohio.

Hon. B. H. WARNER, president of the board of school trustees of Washington, welcomed the members of the Department in the following words:

MR. PRESIDENT AND GENTLEMEN OF THE CONVENTION: As the representative of the board of school trustees and of our local government, I take pleasure in thanking you for selecting Washington as your place of meeting and in welcoming you to the hospitality of the city.

We are glad to see all good citizens of the Republic, those who come here to aid in benefiting any section or class, but it is with special satisfaction we greet a convention of educators gathered here to consider

the most important interests, not only of this, but of coming generations.

As your session has been opened with prayer, I hope the declaration will go out to the country that we still have religion in education, that the American school system is yet conducted with due regard to the obligations we owe Almighty God for the advancement of learning and the development of thought.

Many important topics will be considered, but I am sure the one which is at this time most absorbing in interest is the question of remedying the illiteracy of our land, which, despite the efforts of earnest and consecrated workers, has been increasing instead of decreasing.

A few days since, we heard it stated in the Mississippi River convention that its members came to *instruct* Congress as to its duty, not simply to give advice. It may truthfully be said that you can literally do this, and I hope you will. Tell those who control the pursestrings of the nation, and so largely its prosperity, of the breadth and importance of the great subjects in which you are so deeply interested.

Many of the attractions of the District of Columbia are already well known to you; many others you will discover before you leave.

We have *plenty* of rain, but less than is now afflicting the West; *much* learning, but perhaps not as much as in the East; our climate is not as cold as that of Maine, nor as warm as in Florida; generally we have a happy medium, striving to collect at this central point all the virtues of the different sections of the Union, avoiding the vices.

I hope the genial sun will gladden you with its beams and the clouds which now shadow your commencement will soon pass away. So may ignorance, illiteracy, and crime disappear before your efforts, and the glad rays of information, education, and good citizenship shine out to the remotest borders of our great Republic.

Gentlemen, again I bid you welcome, thrice welcome, to this capital city on the banks of the Potomac.

The president announced the meeting open for the transaction of business.

Upon motion, Mr. J. E. Rockwell was chosen assistant secretary and stenographer.

Mr. WILSON, from the executive committee, recommended that, in view of the length of the program, discussions be limited to five minutes, and his motion to this effect was carried.

Mr. BICKNELL moved that a committee of three to consider the advisability of holding a convention of school officers in connection with the National Educational Association at Madison, Wis., be appointed. Carried.

Letters expressing regret that the writers were unable to attend the sessions of the Department were received from Hon. J. W. Akers, State superintendent of public instruction, Des Moines, Iowa; President George W. Atherton, Pennsylvania State College, State College,

Pa.; Superintendent V. G. Curtis, Stillwater, Minn.; Superintendent John Hancock, Dayton, Ohio; Atticus G. Haygood, D. D., general agent John F. Slater fund, Oxford, Ga.; Superintendent R. W. Stevenson, Columbus, Ohio; Hon. Hugh S. Thompson, governor of South Carolina, Columbia, S. C.; F. N. Thorpe, PH. D., North East, Pa.; Herbert Welsh, esq., Philadelphia, Pa., and others.

Hon. JOHN W. HOLCOMBE, superintendent of public instruction of Indiana, then read the following paper:

SUPERVISION OF COUNTRY SCHOOLS.

The latest biographer of John Quincy Adams, sketching briefly the troubled scenes in which his childhood was passed, says:

> Not much regular schooling was to be got amid such surroundings of times and events, but the lad had a natural aptitude or affinity for knowledge which stood him in better stead than could any dame of a village school.

But of Daniel Webster it is recorded:

> At a very early age he began to go to school, sometimes in his native town, sometimes in another, as the district school moved from place to place. The masters who taught in these schools knew nothing but the barest rudiments, and even some of those imperfectly.

And similar passages occur in many American biographies from that day to this. Occasionally it is related that valuable instruction and invaluable inspiration were received from some excellent person, whom inaptitude for coping with the world or a self sacrificing love for teaching had reconciled to the obscure life of a country schoolmaster. The influence of such a man may be traced in many a town and county and through generation after generation. But too often it stands written that, owing to the ignorance or incompetence of the teacher, the pupil received no benefit from his schooling or made progress in his studies by the force of his own genius and in spite of the unfavorable circumstance that he was going to school.

But in the rural public schools, such as they were, a majority probably of the men who have risen to distinction in our country began their education, and a large number of them obtained in these schools all the regular, the professedly systematic, instruction they were destined ever to enjoy. Such is the fortune, at any rate, of three-fourths of the people. Seventy-five per cent. of the school population is the accepted estimate of those that never receive any instruction beyond what the country schools furnish. So much to illustrate the importance of this part of educational work.

The people of each State, believing in the great benefits of education, not merely to those who themselves possess it, but in a thousand ways to society and the state, have established and do maintain at common expense free schools, to the end that every one may enjoy those benefits himself and that each may enjoy the benefit of their pos-

session by all others, which is the benefit of living in an enlightened community. They do this in their corporate capacity as States. But in so doing the State assumes a grave obligation; for the free schools, offering instruction to all without charge, render the existence of private schools impossible (with exceptions which it is not necessary to consider now). Practically, free schools, when generally established, are the only source of education for the people. Like all institutions maintained and managed by the public, the free schools are deprived of the great force or influence which produces excellence in all other departments of business: the stimulating force of competition. As the merchant must offer as good wares as any other merchant at the same price or see custom deserting his doors, and must offer better wares for the money than any other to draw custom from the doors of his neighbor, so the permanent success of a private school depends, to some extent at least, on its being able to do good work.

From this kind of competition the public school is exempt. Whether the work be good or poor, the revenue is apportioned and the school goes on. But another kind of competition acts on the public schools, and detrimentally to those in the country; that is, the rivalry among school officers for the best teachers and among teachers for the best positions. Positions in towns and cities are the better paid and more attractive. So the country schools become their feeders. As soon as teachers gain skill and experience in the country they are drawn to the towns and cities. It results that the country schools are largely in the hands of the young and inexperienced, or—which is worse—of "those who remain ignorant in spite of experience;" for, in even the best equipped States, the normal schools and colleges cannot supply trained or even educated teachers for more than a small proportion of the schools, especially as the wages that can be offered are not enough to induce the acquirement of first rate qualifications. Inevitably large numbers of them must be supplied by young men and women with no professional training whatever and no knowledge but what they have got in the very schools they undertake to teach. This is not always and altogether an evil, nor is it generally so great a one as would be supposed; for often fresh enthusiasm in the teacher makes up mightily for ignorance of methods, and his zeal and industry keep him ahead of his classes in their studies. But these qualities cannot be depended upon always or often; and, notwithstanding our volunteer army is enlisted from the very flower of the population, the fairest and brightest of the children of the people, yet it cannot do as effective service as a veteran corps.

The remedy for this defect is supervision—a partial remedy, of course, but the best within present reach. Through unavoidable conditions large numbers of the country school teachers are as they are, with but limited education and no professional training. Enough trained teachers cannot be supplied, and persons of education cannot be held

to the work, as their attainments and discipline command better reward in other occupations. The need, therefore, of constant expert supervision is imperative, if the country schools shall even approximate toward their possibilities of usefulness.

It seems to have been believed generally heretofore that no more was needed for a successful school system than houses and teachers. "There are your school-houses. There are your school teachers. What more can you ask?" said the legislatures. But long experience has shown that these simple factors are not enough. The trustees, or whatever the officers controlling the schools were called, knew, as a rule, but little about education, and, as for the fine points that go to make a good teacher or good instruction and successful school management, these were beyond their comprehension. So, in selecting teachers, they were governed by prejudice and favoritism, or, even when most conscientious, by that proverbially fallacious guide, appearances. The people interested might hold their hands and pray that Heaven or fortune would guide their officers to a wise choice, or if they made the selection themselves by popular vote the need of such supplications was tenfold more urgent. In fact, it was a matter of chance whether a competent teacher was secured or the public money squandered on a duly licensed ignoramus. And if he were competent, how little he could accomplish as things then were!

The picture of the old time country school preserved to us in song and story is interesting and not uninstructive. The teacher was there and the birch or hickory also, and on benches of some kind the boys and girls, miscalled "scholars." Classification was carried to the last point of subdivision possible without dividing the pupil; that is, each pupil was a class to himself in every subject he studied. The teacher's time was occupied with hearing lessons, giving from two to ten minutes to each class (as defined above), and in whipping the unfortunates whom the tedious hours, vacant of occupation in well directed studies, inevitably drove into mischief and disorder. The text books were as varied as the generations from which they had been handed down, as dirty as the teacher's linen, as dilapidated as the furniture. It is clear that in such schools a great deal depended on the genius of the pupils, on their having "a natural aptitude or affinity for knowledge."

The necessity of supervision is recognized in all other affairs in which a large number of persons is employed. The efficiency of an army depends upon its numerous officers, every company having the immediate and constant supervision of a half dozen, and this to secure perfection in mere manual exercises, field evolutions, marching and countermarching. Every large factory must have its general superintendent, its superintendents of departments, and its foremen of gangs; and so of every large business or enterprise. This is understood and admitted of city systems. No city or respectable town attempts to carry on schools without intelligent supervision, and the benefits derived therefrom are too

numerous and obvious to mention; but classification, gradation, order, system, method, may be named, and especially the possibility of bringing into each school and to every child the best methods of instruction, the approved results of the practice and experience of the entire profession. How much greater is the need of such supervision in the country, at a disadvantage in so many ways as compared with the city. By close expert supervision our volunteer army of non-professional teachers—three-year boys they may be called, from their average term of service—may be filled with the professional spirit and made to do almost professional work.

In shaping the machinery of school administration the existing political divisions and subdivisions of the State should be used, and the most useful perhaps of these is the township, called, in New England, the town. De Tocqueville says that while men make states and counties it is God who makes the township; by which he means that, while the formation of the larger divisions depends on the policy, conscious activity, and varying fortunes of the governing power, the township is the necessary result of the providential bringing-together of men in all the ties of neighborhood and community of interests. And he sees in the township a characteristic institution of democracy in America, one which has profoundly influenced the development of the Republic.

Fortunate, therefore, the State that has for the territorial unit of its school system this almost natural political division, the outgrowth of the conditions of the people's life. By no other arrangement can the principle of local control be so well preserved and vitalized, without the disadvantages attendant upon minute subdivision and school district politics.

The management of the schools of the township by a single officer, and that one the civil trustee, charged with the general business of the corporation, may be open to criticism, but it is very doubtful if any other plan gives to such an extent responsible administration. And responsible administration is one of the great needs. By this plan there is one man whom all may look to for good schools and hold accountable for poor ones. By this plan there is a manageable number of men to be reached and influenced by the superintendents; so the carrying out of a policy is made possible. One great service of the county superintendency, where it exists in connection with a number of trustees small enough to be reached, has been its influence in educating the trustees up to an appreciation of good schools and a sense of their obligation to furnish them. But the trustee or board of trustees or directors, as the case may be, can seldom be more than a mere administrative agency, clothed with the power of the people for the management of their schools. He is not a professional teacher. He can ably transact the business of building, repairing, and furnishing school-houses, purchasing apparatus and supplies, and employing and paying teachers, but he cannot determine the qualifications of teachers or give to the schools the supervision

needed, expert supervision of school work. For this duty I propose the employment of township principals.

In the graded schools of a town some one teacher is the principal, planning and directing the work of all, himself sometimes teaching part of the time. The application of this plan to the township might be productive of results so far-reaching in their benefits that the imagination fails to follow them. But the immediate and substantial result would be an increase in the efficiency of the schools far out of proportion to the increased cost. The cost, however, is an important matter, and may well be considered at once. Suppose, then, a township employing twelve teachers, at an average of $2 a day each, has a revenue for tuition of $3,360. That sum would maintain the schools one hundred and forty days, or seven school months. But, if a township principal were employed at $4 a day, the wages of the twelve teachers remaining as before, the term would be cut down to one hundred and twenty days. But who can doubt that the value to the pupils of six months' instruction directed by a competent principal would be immensely greater than seven months' schooling of the usual haphazard kind? The work of the township principal would be somewhat different from that of the town principal, on account of the different character of his schools. He could not very well devote much time to the regular instruction of certain classes, for each of his schools would contain pupils of all ages and each grade would be scattered over his entire territory; but his time would be given to making every teacher competent for the difficult work of instructing all the different grades, bestowing most pains upon the new and inexperienced recruits, fully one-third each year of his entire force. He would be a constant visitor in all the schools, oftenest in those that needed him most, doing the work of the normal school model teacher, conducting the recitations of all the classes in their turn throughout all the schools. Much other normal work he would do in teachers' meetings and with his teachers singly, correcting their errors, strengthening their weaknesses, instructing them in methods.

The township system is crowned by a graded or high school, situated at a central point, in which shall be received for higher instruction pupils who have completed the course of study provided in the general schools, as they attain sufficient age and strength to enable them to attend from remote parts of the township. These schools are growing up in many townships, the demand for them is extending, and there is no reason in the nature of things why, with the increase of population and wealth, they should not furnish as extensive and varied advantages as the high schools of cities. The relation of the township principal to these schools is obvious enough.

The next grade in the hierarchy of supervision is the county superintendency, which may be called the right arm—or rather the right and

left arms, both hands, and the ten fingers—of a State system. The county superintendent is simply indispensable. He represents the unity of the county, and through him the unification of its school interests is secured: equalization of benefits to all, of amount and quality of instruction, and uniformity of methods. His special functions are the examination and licensing of teachers and visitation of schools. And the amount of improvement the county superintendents have wrought in the schools of many States by a faithful performance of these duties is incalculable. From their labors have resulted the adoption and enforcement of courses of study and the classification of pupils, a great advance in the standard of the teacher's qualifications, and considerable improvement in the methods of teaching; but in a county of average size the superintendent can exercise only a very general supervision of the actual work of the teachers. He cannot visit all the schools more than twice, at most three times, a year. This, for the purposes of supervision, is ridiculously inadequate. Hence the need of the township principals.

The townships and towns should be coördinated under the control of the county superintendent, their trustees forming under his headship a board of education for securing coöperation and uniformity in administration and their principals forming in the same way an educational council for securing the same ends in the department of school work. Thus, again, it would be made possible to carry out a policy. And thus the State organization would be complete. The superintendent of public instruction and the State board of education could effectively influence and direct every school within their jurisdiction. By the arrangements described the principle of local control is preserved, as was said, with all its vital strength and without its disadvantages, and at the same time are obtained the benefits of a powerful organization, strong by the momentum drawn from large numbers and vast territory, strong by the interaction and mutual influence of its parts, each contributing its excellence to the whole, the whole strengthening and upbearing each.

But other results might follow from the institution of the township principal, less tangible perhaps than those described, less easy to estimate, but—as tending somewhat to infuse into the life of the people a larger measure of "sweetness and light" than they now are blessed with—not less delightful to contemplate. The qualifications of our principals should be carefully looked to. With liberal pay the State could in a few years draw to this service the thousand or two men needed, and could require of them not merely skill in their special art, but a considerable range of knowledge and literary culture. What an influence might such a man exert upon the stagnant life of a rural population! What an amount of social and intellectual activity he might awaken! With time allowed for such work and his thoughts directed in that line, he could make the graded school building a lyceum and

every school-house the meeting place of literary societies and clubs, including young and old. By lectures from himself and others he would bring to the people information, literary, historical, scientific—would excite a thirst for knowledge and a love of reading, and the idea of reading with a purpose. Says Mr. Matthew Arnold, "Culture is *reading*, but reading with a purpose to guide it and with system. He does a good work who does anything to help this; indeed, it is the one essential service now to be rendered to education." No one need doubt the possibility of all this. Rural life in this country is apt to be monotonous in both its scenes and occupation. There are few interests and amusements, and it would not be difficult to awaken interest in the things of the mind. Were the apostles described sent into the townships, the people would hear them gladly, seeing that they taught a way whereby their life might be made more rational and humane. Indeed, Mr. President, these humble agents working directly and intimately among the people might prepare the way for what Mr. Matthew Arnold calls "the elevation of a whole people by culture."

In the discussion which followed the reading of this paper, Prof. A. L. WADE, of West Virginia, said:

I am pleased with the paper, and especially that part which suggests "township supervision." It is good. But I propose to glance at some of the difficulties that lie in the way of supervision in country schools and to see if I can suggest a method by which they may be removed. The necessity for supervision in country schools has never been entirely settled in the minds of the American people. This is proven by the fact that several States, after adopting supervision, have virtually abandoned it. The need of enlightened supervision in mechanical employments, in business, and in government is everywhere acknowledged to be absolutely essential. This is proven by the fact that every factory has its foreman, every railroad has its president, and every nation has its ruler. In systems of education supervision is believed to be essential in every department, except in primary schools. This is proven by the fact that every college has its president and every high school has its principal. Let us try to find out why the masses seem blind to the necessity for supervision in country schools, while they see the need of it in everything else.

In every work where large numbers of men and women are employed, except in country schools, there is a definite work for the superintendent to do, a work that all interested persons can see. The foreman of a factory is required to inform the stockholders at stated periods how many kegs of nails have been made, how many tons of metal have been moulded, or how many yards of fabric have been woven in a given time, and the amount and condition of unfinished material on hand. If we examine carefully the annual catalogue of any school of high order, we find that, in its make-up, it is nearly akin to the report of the factory manager. It gives the names of graduates and the date of

graduation. It gives also the names of undergraduates and indicates the time when each is expected to complete the course of study. I believe it is safe to say that supervision is acknowledged to be essential wherever a considerable number of persons are employed in any work which ought to be completed in a given time. As there has been heretofore no method by which the county superintendent could ascertain how many pupils had actually completed the common branches within the year or what progress pupils had made, he could make no definite report on this subject, and the necessity for his office is not so easily seen as that of the foreman of a factory or the president of a university.

In all business and in all higher schools there is a definite work to do, a definite time in which it ought to be done, and a test as to whether it is well done, while in the country school no such provision has heretofore existed. The country school ought not to be an exception to well established laws of industry and business. It ought to be in harmony with all higher schools. The same educational method should everywhere prevail, from the primary school to the university.

The remedy which I now propose is the introduction of a system of graduation into all the common schools of the country. This system simply takes the primary branches as a course of study for graduation and makes application of all the plans and appliances of the best academies and colleges to the common schools of the country. It is simply the application of an old plan to a new purpose. This system, though still in its infancy, is no longer regarded a mere experiment. At the risk of being charged with indulging in both personal and State pride, I take occasion to say that this system originated in my own State and in my own county. Graduating classes were organized in the autumn of 1874; but the first classes graduated and the first common school diplomas were granted in the spring of 1876, the centennial of American independence. The first common school catalogue was published in the autumn of the same year and alumni associations were formed the following year. So widespread was the progress of the new plan that General John Eaton, chief of the National Bureau of Education, Washington, D. C., in his annual report for 1878, page xlii, says:

> Of all the plans developed none has excited more attention than that known as the "Graduating System for Country Schools," devised by A. L. Wade, county superintendent for Monongalia, W. Va. * * * It has been reviewed in all the educational journals and has excited the attention of the principal State superintendents of the country.

In July, 1879, by invitation, it was my privilege to read a paper on this subject before the National Educational Association, after which the association discussed and adopted the following resolution:

> *Resolved,* That the attention of State superintendents of public instruction throughout the United States be called to the propriety of adopting a graduating system for country schools.

Since the passage of the above resolution several States have adopted

the system entire, others are testing it in sundry counties, and the plan bids fair to become universal.

Permit me, in conclusion, to come back to my subject and say that it is universally agreed, wherever the system has been tested, that it will not work without intelligent supervision. This fact is in its favor, as it proves that the plan has the ring of business about it.

Dr. SHIRAS called attention to the fact that the system of graduation had been adopted in the State of New Jersey soon after its introduction in West Virginia.

Mr. CHARLES W. SMITH, superintendent of the schools of Hennepin County, Minnesota, said: There was a time in the history of the common school when the rural school received but little attention from the great educational leaders and the voice of a county superintendent was seldom heard in these councils; but it has come to pass that to-day earnest effort is being made to elevate the character of rural instruction, and county supervision is receiving a fair share of the time and consideration of this Department.

While the plans proposed in the paper just read are admirable and would, no doubt, if successfully carried out, raise the character and condition of rural schools, yet in many States there is an insuperable barrier. In the Northwest the school district, and not the town, is the unit. In these small districts the people control their own school arrangements, and they will not readily relinquish this prerogative. Frequently, also, a district comprises territory in two or more towns and sometimes in more than one county, thus increasing the difficulty of organizing under a township system and carrying out the ideas embodied in the able paper just read.

In many States we have, at least for the present, to depend on county supervision alone, and if the rural schools are to be elevated it must and can be done by an earnest and efficient county superintendency.

This scheme for systematizing the work in rural schools, as outlined by Professor Wade, of West Virginia, is attracting attention all over the country. Its practicability was for a long time questioned by the leaders in educational circles, many considering its plans and purposes visionary and not adapted to ordinary district school work. The successful development of the plan in several of the States has given to it the attention it well deserves. The workers in this field will be grateful to this Department for the consideration the plan has received, for in it they see a means by which the rural school may hope to do more and better work than heretofore.

A plan substantially the same as Professor Wade's has been thoroughly tried and successfully carried out since 1878 in the county of Hennepin, Minnesota. It has passed an inquisitorial review and a popular verdict declared in its favor. By it we have secured a higher order of efficiency in our school work. The tendency to change teachers fre-

quently has been checked. The attendance has been more regular. Self promotion by the pupil has been prevented. The pupil is enabled to do more work in a given time and he is supplied with an incentive to complete the full course of elementary studies. The superintendent is assisted in ascertaining the precise instruction given in each school, and is thus enabled to direct judiciously the entire work of the county. The time of the teacher is economized, as the daily recitations are reduced to the minimum. Influential motives for work are supplied, and thus the school is prepared to be governed more easily. Children moving from one district school to another readily find their proper places in a new school.

Our confidence in the plan is strengthened by the added experience of each year. We believe it to be in harmony with the demands of the times for a thoroughly practical and economical system of education.

Mr. HOUCK inferred from the paper read that the impression was being made upon the minds of many that the work done by the country school teacher does not compare favorably with the work done in towns and cities. So far as he knew, some of the very best work that is done by teachers anywhere is done by teachers in the country schools. He added that, in the examinations that have been held in some of the leading cities of Pennsylvania to decide who shall go to Annapolis and West Point, he had known young men from the country schools to take the lead. Many of the most successful men in the various callings of life were boys in the country schools. When the schools in the country are loaded with the machinery so common in the cities the country teachers will be weakened. What is needed is to make the teachers strong, to give them better pay, and to make the terms longer. Make the teachers strong, and then the school work will take care of itself.

Mr. DICKINSON said that when he first entered upon his work as secretary of the Massachusetts State board of education he turned his attention to the supervision of the schools. He found that wherever the superintendence of the schools was good there the schools were good also. In order to reduce school work to unity there must be one controlling mind. It is the duty of the superintendent to select good teachers for the schools, to make good courses of instruction, and to direct the teachers to right methods of teaching. One of the most important changes now needed in our school affairs is in methods of teaching. Pupils should no more be required to make words the original sources of knowledge of things described by the words, but they should be permitted to take hold of the things themselves, and learn of them by their own observation and reflection. It is very important that the schools should be provided with school-houses constructed with reference to comfort, convenience, and beauty; that the schools should be properly supplied with the means of teaching; and that the school attendance should be as complete and thorough as possible. To bring into existence all these necessary results, there must be placed over

the schools well trained men, whose duty it is to give all their time and talents in directing school work.

In Massachusetts the large towns and the cities are able to provide themselves with trained superintendents, but the small towns are not able, and so a plan has been devised by which several small towns are combined into one district and a well trained superintendent put over the district.

The other day, he said, he was called before the Massachusetts legislative committee on education. The question before the committee was "How shall the State government aid the smaller towns in conducting their schools?" He was pleased to find that it was the unanimous opinion of the committee that the most effective aid that could be given to the towns was such as would enable them to provide themselves with school superintendents.

The last speaker said: "If you put good teachers into the schools they will make the schools good." This may be true; but how shall we get the good teachers into the schools? If this matter is left entirely in the hands of the school committees this good result may never take place. One of the most productive acts that our school supervisors perform is to select good teachers for the schools. A man skilled in all the affairs of school teaching and school organization and school management is needed to act as a medium between the schools and the school committeemen and perform a service which they cannot perform. He felt strongly on this subject, and he knew that the schools of this country would never accomplish what it is their privilege to accomplish until they are presided over by intelligent, well trained, conscientious, enthusiastic superintendents.

Superintendent BAER thought that Dr. Dickinson had put the question fairly and squarely. Here are schools; here is work to be done; here are teachers that need to be improved, that need instruction in the matter of organization, discipline, and in the manner of imparting knowledge. How shall these be reached and how shall this work be done? In Pennsylvania the county superintendents have charge of the county institutes and arrange the courses of instruction for them. Then there are also counties in which local institutes are held. The superintendent appoints an educational meeting at a given place for one or more days, and here he gathers the teachers of that section of the county, the parents of the children, and sees that the children themselves are represented in some of the exercises. In this way every teacher is reached, his own peculiar wants are met, and the entire community is benefited. He believed that superintendents could accomplish more by such agencies in the way of arousing enthusiasm and public sentiment than by the graduating system.

General EATON wished to call attention to the fact that as the quality of supervision is raised the better educational work desired becomes recognized. There is, perhaps, no community in the land where there

is not some thought of opposition to the school work, some disposition to have a lower grade of work done and to criticise the higher and better work. Out of this supervision better teachers are employed and the community is brought up steadily towards the best work.

In addition, he wished to say that in response to an inquiry he had recently reviewed the salaries of State superintendents, and confessed renewed amazement at the high character, the great ability, the enthusiasm and consecration and sacrifice of the men who are carrying on the supervision of the schools of the country to-day. Not only the teachers, but the superintendents, should receive better pay.

INDIAN EDUCATION.

Hon. J. M. HAWORTH, United States superintendent of Indian schools, was introduced and spoke as follows:

Indian education, its condition and prospects, is the subject on which I am requested to address you this morning.

While I appreciate the honor of the privilege conferred, I approach the task with diffidence, inasmuch as since being invited to take part in this meeting I have constantly been in the field of active work, surrounded by the pressing present, without time to crystallize into words and place on paper such information and ideas as I would like to lay before you.

Only during the last few days have I found time to sit down and think about it. The last ten or twelve years of my life have been spent in active work among the Indians of the frontier, and the preparation of matter intended for the public ear and eye has not been a part of my labors. However, if by my humble efforts anything may be said or done which will assist the work or promote the interests of the race in whose behalf I speak, I shall cheerfully submit to whatever criticisms my hastily prepared and imperfect sentences may give occasion.

The present condition of Indian education is not up to the standard some of its friends think it should be; and this is especially true in the opinion of some of us who have more recently espoused the cause. Influenced by a strong, enthusiastic, and commendable desire to see it advance rapidly, we grow impatient with what seems to us to have been unnecessary delay in its progress. But we must not lose sight of the fact that it has only been a little more than a decade of years since anything like a general effort in the line of education was first made. Those efforts have been limited and in many respects very imperfect, yet they have been productive of great and good results.

In most of the tribes the traditional prejudices and superstitions against schools have been overcome, followed by a willingness on the part of the Indians not only to have their children educated, but by an openly expressed desire on the part of many adult Indians themselves to gain knowledge, a fact which is evidenced by the attendance at the night schools.

Neither must we lose sight of the fact that in the last twelve years many schools have been in successful operation in tribes which previous to that time had never had the school-house door opened to them, and that many hundreds of their children who have attended school are now mingling with the tribes, exercising a much better influence than they would have done had such privileges been withheld. This number is seldom taken into account in our calculations of to-day.

In some of the tribes not even a missionary effort had been made fifteen years ago. They had no knowledge of anything pertaining to education of either head or heart. The Indian child's mind was filled with wild-traditions and superstitions, which grew and increased with his advancing years.

The prejudices imbibed in childhood and cultivated to riper years are very difficult of eradication. "As the twig is bent the tree's inclined" is an old but true saying. The mind of childhood, even in the enlightened and cultivated race, often receives strong impressions which are hard to overcome. Our own experiences testify to this fact. I well remember when a boy how my mind was influenced politically. My father was a strong Henry Clay whig. I would sit and hear the good deeds and grand principles of the old whig party discussed and extolled and those of the democratic party condemned, until I thought one embodied all that was pure and good and the other just the reverse, and I would look with pity upon the democrat and wonder if it were possible for the poor fellow ever to be saved.

We are very apt to be what our fathers were; possibly a very large percentage of the members of the great leading parties of to-day have inherited their ideas and cling to them without much reflection because their fathers were of the same faith.

Among the wild tribes of Indians, their peculiar ideas and prejudices are the theme of conversation around their lodge fires. As we discuss the grand achievements of our great men around our hearthstones and point out to our boys the possibilities of like attainments, so do the Indians tell their sons of the great deeds of the different chiefs and arouse in them a spirit of emulation.

With them greatness sometimes results from successful raids, the braves returning laden with spoils and carrying aloft the freshly taken scalps of the enemy. On these occasions the approach to camp is made amid the firing of guns, the shouts of victory, and songs of welcome. Combined with their political prejudices are those of a religious character, inculcated, as the others, from the earliest dawn of intelligence.

I believe that superstitious fear is the strongest controlling power in the Indian nature. It presents itself in various ways; each seems to have his individual peculiarities in this respect. Some of them will not smoke with a gun or pistol near; some remove one and others both moccasons before smoking; some regard it as bad medicine to look into a mirror.

I presume I do not greatly exaggerate when I say that with the skin of a bear I could stampede the whole of some tribes, notwithstanding the fact that the animal in question forms a frequently recurring feature in their names.

In some extreme cases of sickness, the medicine man, almost nude, calls to his assistance several of the tribe, who are required to remove their moccasons, lest the good spirit should be offended at their want of reverence; with horns and bells, they march around the lodge of the sick, driving the evil spirits away. These superstitions give the medicine man a wonderfully controlling influence; the Indians never seem to doubt his power or for a moment suspect the honesty of his acts.

One of the medicine men of a southwestern tribe at one time accidentally swallowed a part of a needle which his wife had broken and handed to him. Becoming alarmed he applied to the agency physician for relief, who told him nothing could be done for him. Not being satisfied he applied to one of his fellow doctors, who, scarifying over the stomach and drawing with his mouth, soon presented a needle as drawn from it, to the apparent great delight of the patient. The agency physician, anxious to witness the result, remained, and examining the needle found that the Indian doctor was not only a success as a surgeon, but also as a trickster, inasmuch as the needle pretended to have been taken from the patient was whole and the eye filled with dry dirt. These prejudices are inherent and it is not to be wondered at that they are difficult to overcome.

Do we not remember in our own experiences some superstitious notions which we are wont to ridicule and yet, when from some unforeseen cause or accident we are suddenly reminded of them, they are apt to cause a momentary feeling of apprehension and discomfort? Among educated people there are many who prefer to see a new moon over the right shoulder, others could not be prevailed upon to commence a journey on Friday, while others are made nervous if they happen to put on a stocking wrong side out. One reason why these superstitious ideas have such a strong and governing power over the Indians is their association of such ideas with the supernatural. They have great faith in the power and willingness of the great spirit to aid them.

At one of their annual tribal medicine convocations a few years ago, water was very scarce and they were in great necessity; the whole tribe were collected together with their vast herds, which in those days numbered many thousands; a day's exercises were devoted to making medicine or offerings for rain; the next day it came in torrents, accompanied by thunder and lightning. A lodge which was occupied by the head Kiowa chief and some Cheyennes was struck by lightning and two Cheyennes killed. The Kiowa chief, in explaining it afterwards, said he was only making medicine for the Kiowas and it was too strong for the Cheyennes.

I could refer to many other instances which have come under my ob-

servation or knowledge bearing upon this peculiarity, but those given are sufficient to show how strong the wild educational influence is which has to be overcome in our teaching. It is true, when taken as a child, only the seed and not the growth has to be contended with, but the full grown plant often rises up before us in the person of the parent when we ask for the child to be sent to school. Then parental affection combines with fear against the request. Their attachment for their children is very great, equal to that of the white race, and they part from them with no less reluctance.

Unsupported by the quickening influences of intellectual culture it is difficult for them to realize that even the temporary separation is for the benefit of the child. The strong love for the child is shown when death removes him. I have known the mother in her great sorrow to sacrifice the first joint of the fourth finger of each hand on the death of a child.

If the years which have passed, in which we think but little has been done, have served to overcome these prejudices to such a degree that children can now be obtained without much trouble, not only for the agency schools, but to go away from their own country, then should we, instead of sitting down to lament the past, go forward with a rejoicing spirit that so many difficulties have been surmounted, so many barriers removed, though so much remains yet to be done, believing that the time is coming when the rays of light and warmth which emanate from education and Christian culture shall fully penetrate the night of gloom which hangs over so much of the Indian world, and superstition and ignorance give way before its burning rays, and from that heathenish darkness come forth sons and daughters clothed in right minds and ready for their parts and places in the management of the affairs of this great nation.

The second year of the peace policy, 1870, affords the first statistical information I have been able to collect as to schools. The number reported, not including the five civilized tribes of the Indian Territory. was 60 schools, with an enrolment of 3,095 scholars, the five tribes referred to reporting 145, with an enrolment of 1,629 scholars, making among all the Indians 205 schools, with an enrolment of 4,724 scholars. For the year ending June 30, 1883, the number of schools reported was 412, with an enrolment of 15,225 scholars. In 1870 the school employés numbered 192; in 1883, 961.

Dropping out the schools of the Five Nations and only including those known as Government schools, the increase from 1870, with 60 schools and an enrolment of 3,095, to 1883 is to 198 schools, with an enrolment of 10,247 scholars. The numbers who have attended schools and ceased to do so during the interim of the dates are not included in this calculation. The average attendance of 1883 was 6,504. The greatest increase of any one year was from 1882 to 1883, amounting to 1,402. I believe the increase from 1883 to 1884 will be still greater.

Of the schools named, 77 are agency boarding schools and 117 are day schools, which are denominated Government schools and do not include those of the five civilized tribes, who have an independent school government conducted under their own laws; in addition to which, there are the industrial schools at Hampton, Va.; Carlisle, Pa.; Forest Grove, Oreg.; Albuquerque, N. Mex.; Chilocco, Ind. Ter.; near Arkansas City, Kans.; and Genoa, Nebr. New buildings are also in process of erection near Lawrence, Kans., for 340 children, which we hope to have ready for occupancy early in next April.

All the schools named will give us facilities for about eleven thousand children in what we denominate Government schools. Besides these there are some under missionary control, including one of the most important training schools, superintended by Rev. A. L. Riggs, at Santee, Nebr., from which school have gone out Indian teachers and preachers who are doing much good among their own people.

Provision was also made by Congress for placing children in industrial institutions in the States, under which arrangement 431 children are now in such schools. I have great faith in this plan, as it will educate the races together and add materially to the opportunities of the Indian children. Under all provisions now made, Government and missionary, about 11,500 children can be accommodated.

The reports from the various schools have generally been satisfactory and give evidence of progress in the past year's work.

The increase of industrial teaching has had a good influence in giving new life and interest to the pupils. Captain Pratt, of the Carlisle school, says in his report:

> We invariably find that when an idle or mischievous boy is put to work at a trade his standing is raised in scholarship as well as conduct. In some cases the improvement has been very remarkable; in not one has it failed of good results.

The superintendent of the Pawnee school says:

> The boys of this school took charge of the farm with the understanding that all the products, excepting that required for the animals they used, should belong to them: 800 bushels of corn, worth about $400, rewarded them for their labor, in addition to the school privileges.

Several other agency schools give good accounts of the persevering industry of the pupils, but generally speaking the facilities for industrial training at agency schools, aside from the farming season, are very limited. Hampton, Carlisle, and Forest Grove are producing skilled workmen in various branches, and in so doing are not only educating the boys to trades, but furnishing wagons, harness, boots and shoes, tinware, and other useful articles to the agencies, thereby utilizing the labor of the learner.

Superintendent Minthorn, of the Forest Grove school, in his report for 1883, says:

> The first two lots of children that were brought to this school came with the understanding that they were to remain three years; that time having expired, they have

been allowed to return home. Fifteen of them have returned to the school with the intention of remaining two years longer, and, with the exception of two, those remaining at home are doing well. Three of the carpenters are working at their trade in New Tacoma, Wash. Ter., taking contracts, furnishing all the material, and building houses, giving good satisfaction and making good wages. Boys who have learned trades can get from $2 to $4 per day and plenty of work.

He adds:

The indications seem to be that pupils leaving this school, after having completed the course of study and learned a trade, will generally seek employment among white people.

Among Indians, marriage is generally consummated at a very early age; especially is this true of the females, who, on entering their teens and sometimes before, are formally sold by their parents to become wives. In view of this fact additional interest is added to an experiment being tried by General Armstrong, at Hampton, referring to which, his report says:

A feature of this year's work has been the taking of young married people as students in the school. Three such couples have been received, two from the Omahas and one from the Sioux tribe. The Sioux and one of the Omahas each brought with them a little papoose about a year old.

The parents attend school half a day and work the other half with the other scholars. We have attempted at Hampton nothing more hopeful than this in training Indians; the husband and wife advance together with common interests, a home will be established on their return to the reservation and their future will be comparatively secure. It is interesting to notice, as side issues in this experiment, the increase of courtesy in the brave for his wife and the growing care of the mother for her child, and the efforts she makes to keep her husband's possessions, her room and her baby, and last of all herself, clean and tidy. At first the father evidently regarded tending the little bit of humanity with scorn, but he has grown to take great pride in his boy, and often relieves the mother now of a part of the burden.

The good accomplished for Indian education by the three important institutions to which reference has especially been made cannot be estimated. While those situated at agencies have been moving forward, overcoming prejudices and removing obstacles, doing good for the tribes, and making possible the outside institutions, they have not themselves reached the outside world or "become as a city set upon a hill." Little has been known of them outside of those immediately interested and official circles. On the other hand, those situated in the midst of civilization have attracted the attention of the curious as well as the interested, and have thus been able to exhibit to the many the possibilities of Indian education and to create in its favor a public sentiment which has found its way into the halls of legislation and borne substantial results, thus helping to sustain the humbler institutions at the agencies, where the great mass of the children must be educated. For, as it is impracticable under our treaty relations to remove them all from home, and even with common consent it would still be impracticable, and without consent a violation of the laws of humanity, only the

smaller number can have the privileges and opportunities of the outside schools.

In response to the increasing sentiment of not only the possibility of educating the Indian, but our duty to do it, Congress has increased its appropriations in that direction, and greater facilities are thus given to those having the matter in charge. Without favorable legislation the work would move slowly. As already stated, most of the tribes have reached a point of willingness to send their children to school, realizing that their ways of living are taken away from them and that other ways are necessary. This willingness must be met on our part with the offered opportunity, and the Indian not compelled to stand as a suppliant at our gates.

The Utes, who have been among the slowest to accept educational privileges, allowed 27 of their youth to be taken to Albuquerque, N. Mex., during the past summer. These were the first from the Southern Ute Agency who have ever attended school.

They were sent to Albuquerque without much notice to the superintendent, whose old and temporary buildings were already nearly full, referring to which arrival he says:

> The 27 wild Utes suddenly thrust upon us made no serious disturbance in our quiet life. I think it worthy of note that we have been able to bring these untamed savages so quickly under obedience to our regulations. In our unprepared condition, with no provision for physical coercion and with fully one-third of the newcomers grown men and women, it has surprised us that no serious case of insubordination has arisen. Brought up from infancy to regard labor as beneath the dignity of manhood, they have taken their places cheerfully and willingly in the assignment with the other scholars.

I recently made a visit to the Cheyenne and Arapahoe, Kiowa, Comanche, Wichita, and Caddo tribes to arrange for children for the Chilocco school, near Arkansas City, Kans. I had proportioned to the tribes named room for 90 children, and was not without some doubt about securing that number, as it was in the midst of winter. My doubts were, however, agreeably dispelled, as they not only gave the 90 asked for, but 34 more, making 124 who were brought to the school in wagons, most of them having to travel 175 miles through an open, uninhabited, wild country, in the coldest part of the cold month of January; they were nine days on the journey. The opening services of the school were had January 21, with 132 children present, to which 40 more have since been added. Seventeen dialects will be represented in this school.

The children for the Genoa (Nebraska) school have been collected at the Rosebud Sioux Agency and taken to the school in the winter. These schools are both to be conducted on the industrial and training system.

The Osages are a very rich tribe, with large money annuities. A portion of the tribe have been very backward in sending their children to school. They have a form of government, placing the control of busi-

ness matters in charge of a council. Recently the council decided to cut off the annuity from all children who do not attend school at least six months in the year. This provision will fill, or has filled, their school building to its full capacity. This was their own act.

While these results are very gratifying, there is still one very discouraging feature, viz, the great difficulty of getting an equal number of the sexes. The custom already referred to, of disposing of their daughters at a very early age for wives, gives them a marketable value. This source of revenue would be cut off by sending the daughters away to school.

Polygamy is common among the wild tribes, and it often happens that the girl of twelve or fourteen years becomes the second, third, or fourth wife of some man of advanced years. Possibly this might be broken up by legal enactment, but in cases where both are young I believe General Armstrong has found the remedy: educating both together.

The general willingness of the Indians to avail themselves of educational privileges is becoming a settled fact. Their capacity for education has been demonstrated for many years in several important institutions of our country, and testimony to that effect is being daily added.

We are now utilizing the labor of Hampton in the employment of two of its young men graduates: one as principal of the Shawnee boarding school, Thomas Alford, a Shawnee, and James R. Murie, as assistant teacher at the Pawnee boarding school. In both cases satisfaction is rendered.

At Chilocco, we have two Kiowa girls and a Comanche young man from the Carlisle school, all filling important places and, the superintendent says, doing well. Of the ability of the Indians to master trades and become skilled artisans as well as succeed in intellectual culture, there is no longer any question, and they are not less susceptible to heart culture than to intellectual training. Their naturally confident and trusting disposition in the power and ways of the great spirit renders missionary work among them much more satisfactory than with those who bow down to idols of men's hands.

Instead of being entirely cold and stoical, as is generally supposed, they are like other men. I have seen the strong man, the stern warrior, yielding to the emotions of the heart and appreciating sympathy in time of distress even as we do. I have felt the warm hand as well as witnessed the flowing tear of sympathy as it came to me, from the wild man of the plains, when death had visited my household and removed one of my loved ones. The heart of the Indian is sensitive and susceptible to the finer feelings, only needing to be worked over in the hands of the great Master to become a fit temple for the indwelling of His spirit. The missionary labor of almost half a hundred years, handed down from father to sons, of the Williamson and Riggs fami-

lies, and the more recent labors of Bishops Hare and Whipple, their faithful assistants among the Sioux, have been the means of removing much of the opposition to schools, as well as causing two large colonies of those once wild and savage people to dissolve all tribal relationship and enter upon and possess farms from the public domain. Over half a thousand of them are to-day living in homes of their own, surrounded with all the privileges of citizenship. Their experience and example are the strongest possible arguments in favor of education, civilization, and christianization of the Indian.

Most of the obstacles have been overcome; a willingness to receive an education is shown, a capacity to receive it is no longer doubted. How is it to be done?

A great many theories might be advanced in answer to this question, but those proven by practical demonstration would seem most worthy of consideration.

I like that answer which says, "Teach them as you would anybody else, not forgetting that Indians are men and share with us the common conditions of humanity, and that their minds are subject to the same laws of development as ours. The science and art of teaching are just as applicable to Indian children and youth as to those of the white race." But there are some special conditions involved in Indian education which, while not bringing in any new elements of training and instruction, emphasize them differently. Especial attention must be given to teaching him to think. While his perceptions are keen in certain lines, his reasoning powers are slow; his mode of life and habits have taught him to rely upon memory, which has thus been well cultivated, and this leads into error in his teaching. An imperfect understanding of language between teacher and pupil often causes carelessness, and rote teaching follows. Memory, and not the reasoning powers, is called into play.

I visited a school some time ago and listened to a class in history who without trouble recited a whole chapter relating to the discovery of America by Columbus, but when stopped by me and questioned they were unable to answer the simplest question embraced in the lesson. Allowed to go back and commence at the beginning of the chapter or verse, they could repeat without difficulty up to and embracing the answer asked for, but would continue on unless stopped. This manner of teaching is killing to all power of thought; far better to have a little and thorough work, that which will quicken the mind, make it alert, and trained to act as required. The very best teachers are needed for Indian schools, and the common idea that anybody can teach an Indian school is very far from correct; the best talent is required. Physical training is no less important than intellectual. While industrial training is only one subdivision of the great law of physical culture, it is the most important for the Indian. He has none of that home training which comes to the child of civilized parents as his best heritage. His training has been for the chase and sports of a wild and barbarous life, developing muscu-

lar powers in a different line from that required for use in civilized pursuits. He can bend a bow with ease which will scarcely yield to the efforts of the stoutest farmer, but when he comes to use the axe or pitchfork his muscles soon relax. He needs the industrial training to fit him for the peculiar duties of civilized life.

No less important is his moral training. By the knowledge of Christianity he gains the moral power which will carry him successfully through the conflicts that await him in contact with civilization. There are many interesting illustrations of the faithfulness of Christian Indians. Mr. Riggs, in Sioux history, says that not one of those who had made a profession of Christianity under the missionary labor of Dr. Williamson and himself among the Santee Sioux took part in the war and massacre of 1862, though some were imprisoned for it.

The great object of Indian education should be to make them self reliant, and care taken that we do not educate them out of their old lives into one leaving them helpless and proud.

After completing their school years the majority of them will return home financially poor; only a few can find employment at the agencies; and without work they cannot obtain money with which to buy clothing, and citizens' clothing is more expensive than their peculiar dress. The Government issues less than one poor suit of jeans a year to the men, but more of blankets and piece goods. Without money the natural result is a return to the camp and blanket, however unwilling they may be to do so. While this is bad for the males, it is worse for the females, whose sense of morality and propriety has been sharpened and cultivated by that education which, without further help, will not make their lives more comfortable. It is therefore very plain that our labors and responsibilities do not cease with furnishing school-houses and educational facilities to them, but we must render other and more material aid.

If it were possible to persuade them to find work among white people, and only return home on a visit, or not at all, that might meet the case; but this cannot be done, as most of them will return home to remain.

A very large treaty indebtedness remains due and unpaid to a number of the tribes whose children are being educated away from home as well as at home. A small part of that appropriated each year could be used to make homes for those who complete their course of schooling, and thereby amends be made for failures to pay according to agreement when it should have been done.

It would not be impracticable to enter into an understanding with the Indians that at the expiration of a certain term of schooling the returning pupil would be helped to select a small farm, build a comfortable little house, and furnish it, receiving a full set of farming implements, including wagon and team, all of which would not cost over \$500 or \$600. This would give them a substantial start in life and enable

them to support themselves. It would be far better if this could be done on land away from the tribes. For instance, where the Chilocco school is located is a fine farming country, within a few miles of a good market. The land can be bought from the Cherokees for a very small price. Twenty thousand acres of it would make 125 homes of 160 acres each, or 250 of 80 acres each, and would accommodate, and I have no doubt be accepted by, many of the returning pupils of the agencies of the Indian Territory; and those so settling would be under the immediate influence of the officers of that school.

For those of the northern agencies other places would have to be (and no doubt could be) found on their own reservations. Most of them must be farmers. For others, arrangements might be made for tanneries and manufactories of the leather into harness, saddlery, boots and shoes, &c., and the hides of the slaughtered animals might be utilized to good advantage, and employment given to many at the larger agencies.

I am aware that this may sound speculative. I am equally aware that something must be done for the youth, especially among the wild tribes, whose school terms close and who return home.

A very important matter, and not to be lost sight of, is citizenship. All pupils attending school for three years should, upon arriving at legal age, be declared citizens of the United States. I met an educated Indian man a short time ago in a Kansas town, who said it made him feel bad to come to that town on election day and be deprived of the rights he saw conferred upon an uncultivated black man, while he stood by, only a poor Indian.

The grandest prospect of Indian education is its natural result: individuality of ownership in lands as well as personal property, farms and settled homes, citizenship; for the Indian cannot be educated and remain an Indian in habits. Education opens to him a new world of thought and opportunities, but this need not be confined to the youth. The industrial part must be extended to the adults, and most of them are ready for it, and must be so taught before they will be willing or prepared to accept lands in severalty. Remove the statute clause limiting the amount of funds to be expended at an agency in helping Indians; give the heads of the Department and Bureau the right to exercise their good judgment; put the agencies in charge of men whose interests extend beyond their salaries, and with liberal appropriations and judicious expenditures in helping the Indians to make farms and build houses we would not have to await alone the slow process of educating the children to see the civilization of the Indian race.

Capt. R. H. PRATT, superintendent of the Indian Training School, Carlisle Barracks, Pa., spoke as follows:

I read a speech the other day, delivered by Frederick Douglass at Hampton Institute, Va., which hits my case exactly. He said that he

had been called upon frequently to do things for which he was totally unprepared by previous education, and I come before you educators of the country in that condition to-day. My school room education might be crowded into a period of two years. I never studied grammar and never got beyond decimal fractions in arithmetic. My mother was left a widow with three children, in straitened circumstances, when I was quite young. At thirteen years of age I began to look out for myself, and have so continued from that day to this. My education in the school of experience has been very wide, and that is, perhaps, what has put me forward.

I have been in the Army since 1861. After the war I went out among the Indians as an Army officer. Having been offered a commission as second lieutenant by Mr. Colfax, then Speaker of the House and Representative from my district in Indiana, I accepted it, and joined my regiment in the Indian Territory. From 1867 to 1875 I served in the cavalry among the Indians in that Territory. I served with my command, which was stationed among the tribes over whom Mr. Haworth was agent, several years before he came there. More than any other officer of the command, my military duties were in connection with the care and management of Indians in some way, either as scouts, prisoners, or as tribes. We had wars with them, and I commanded wild Indian young men of the Comanche and Kiowa tribes, fighting with us against part of their own and other tribes. I was three years in Florida, in charge of Indian prisoners. I was a constant observer of the practices and methods of reservation management. My interest in the Indians has grown up in these channels.

To my mind the solution of this Indian problem is to be secured through bringing to bear upon them more than all else the school of experience. If we really desire to civilize them, we must bear upon them with all the appliances of civilization, just as we would teach a boy to swim, not by putting him into water ankle deep, but by sousing him into a sufficient quantity that will enable him to swim. I am one who believes that it is not only possible, but practicable, to bring to bear upon all Indians, old and young, such civilizing influences as will make them all good Indians, even the old and hardened. I believe this from experience. The appliances will have to be ample and in many cases very strong. Education should reach all the youth and be enforced where necessary; and, if an older Indian commits murder, the civilized custom of hanging or sending to the penitentiary for life should be applied with just as much certainty (a little more certainty would not hurt) as it is applied to the so-called civilized person who indulges in such savage practices.

To illustrate: I have seen my Indian scouts, while on the march over the great plains of the Southwest, chase down a lot of wild, full grown horses, some of them advanced in years and inured to their wild, free

life. They did it by dividing their party into several small parties, and having fixed the direction in which they would chase the horses they placed their smaller parties at intervals of several miles, and then started one party to drive in the direction of the first party. Those starting pushed their own animals to the top of their speed, but the wild horses easily ran away from them. The second party of Indians, starting in as the wild ones passed, pushed hard after them toward the third party; but still the wild horses outran them. At the end of this relay, having by this time ran four or five miles at the top of their speed, the wild horses began to fag and the next party easily overtook them and keeping up a good speed still further reduced their strength and power to escape, and the last party easily drove them into camp and captured them. They were immediately lassoed, thrown down and tied, so they could harm neither themselves nor those who worked with them, the Indians forcing them to keep up their struggles by going over and slapping them with their hands, shaking blankets before them, whooping, standing upon them, and two, three, or four sitting upon them, until the poor horses, completely exhausted, would entirely cease to struggle, and, being completely conquered, were ready to do anything required. After this they were saddled and ridden for a time; and I have seen horses so captured in the afternoon of one day ridden by their captors on the march the next day. They were subdued, trained, and useful.

Now, here comes the vital point. I noticed that the Indians were wise enough to keep them subdued and to continue their useful labors from day to day thereafter. As we marched on we saw other droves of wild horses. Had the scouts been so silly as to get down from their captured and trained horses when we came in sight of these other wild ones, and to take off their saddles and bridles and turn their captives loose to join the others, do you suppose the captives would have failed or refused to do it, or that they would not within a very short time have become, in almost all respects, their same old, wild selves again? Or put it in another way: suppose the scouts, after having made the horses amenable to themselves, had turned them over to some weak, inefficient, and fearful persons in whom the keen-eyed horses would not have recognized masters. Do you suppose there would have been no difficulty; that the same usefulness and amenability would have continued? Not at all.

As an officer of the United States, I have taken a lot of wild Indians, some of them from Major Haworth's own agency and the very worst he had. By order of the Government, they were chained, some of them hand and foot, so there could be no successful resistance; they had to go. I took them to Florida, and, having them far enough away and under such surveillance as prevented any hope of escape from the systems of training adopted, I was able to keep them at work and to direct their efforts, mental and physical, into proper channels. Under

such civilized appliances and immersed in a measure in the surroundings of civilized life, they took on civilization. Their irons were early removed and as soon as possible kindly treatment was adopted. Their labor was made profitable to them, and such liberty extended as was possible. They became anxious to learn the English language and to work, and the younger ones to get an education. Their success in these directions was admitted by every observer. At labor they excited the jealousy of the other laboring classes of the community, and petitions were circulated asking members of Congress to have me stayed in my efforts to get them into these laboring lines, where rights and privileges were endangered by their competition.

About the time they were feeling their own power and capacity in these branches of labor and civilized pursuits these Indians were returned to their people. The saddle and bridle were removed and they were turned loose among the wild horses. There was one Indian agent who, in the management of his herd, had sufficient power, grip, and control over them to make good use of these returned men; and for six years past I may justly claim that the most of these former prisoners returned to this agent's care have been a valuable element in their tribes. It was natural that the wives and families of these men should pull them back to their homes. Had their wives and families been permitted to go with them to Florida, and the civilizing influences of labor and education borne upon them as well, and then, at the expiration of their confinement and tutelage, they had been permitted to scatter and remain among civilized people, they would have continued to forget the things that were behind and would have pushed on to perfection.

The great trouble is that we hold our Indians segregated on reservations and away from the opportunities that make other men. We educate some—a very, very few—and then we kill the life and hope that we have put into them by sending them back to their reservation and segregation life. We do not stop the German, the Irishman, or the man of any other nation from going where he likes in this country; but an Indian, be he ever so well educated, receives no encouragement to go anywhere or be anything else but an Indian upon an Indian reservation, under the control of the Department. I mean this; I feel it.

Now, Mr. Haworth says that the education must be mainly upon reservations; that it is not practicable to educate them off the reservations. I say that it is not practicable to educate them on the reservations, if we desire them to be anything else than Indians and tribes. The condition of our most advanced Indians to-day proves this. Great and powerful as we people of the United States are, full of progress and wealth, the whole land teeming with industry and prosperity, and miserable and degraded as the Indians are, and educated as some of them are, with every argument of peace and prosperity against them, you do not find any among them who desire to be anything more than

Indians or members of a tribe, simply because the Government and the people, in their dealings with them and the limited training of them, allow them little or no experience in the benefits of civilized life. There is, rather, constantly before them the pauperizing school of the ration system—food without labor—which would degrade and demoralize any people.

We are met by the assertion from the high authority of the superintendent of Indian schools that it is not practicable to remove to schools outside of reservations our forty thousand Indian children. Not practicable to do it? I have under my care at Carlisle four hundred and seventy-one Indian boys and girls, coming from thirty-seven different tribes. Many of them I have placed out in families in Pennsylvania. They go to the public schools. This move has the substantial support of Dr. Higbee and the educational people of the State. During this past winter I have had eighty-two boys and girls so placed. They earned their own way. While out from the school they cost the Government nothing. It is a success; the Indian boys and girls have demonstrated their capacity and are in demand. The point to be reached in this Indian educational work is the placing all Indian youth in schools and yet have no Indian schools. Except they are used to prepare Indian youth for these wider, broader, and absolutely essential experiences and advantages, I do not believe in Indian schools of any sort, either on or off reservations. There is no broadening experience in them; they only say to the Indians, "You are a separate people and must so remain; you may improve a little your civilization, your government, and affairs generally; but you must remain as Indians." We must break up this seclusion and give to them the same rights we give to every other nation except the Chinese. The Indians are here; they are not in Asia, nor are they in Canada or in Mexico. They are here in the United States; they are ours, every one of them, old and young, and I believe that plans can be brought to bear in the space of five years that will make all of them fairly independent, self supporting citizens of the United States, and give to them the courage to go and come throughout the country and to make use of our ways of life.

[The bell here announced the expiration of the limit of time allowed for the discussion. On motion of Professor Ogden, it was unanimously agreed to give the speaker an opportunity to go on.]

Captain PRATT continued:

I will relate an incident that will shadow the present situation, as I look at it. Early in 1861 I started with my regiment to march from the capital of Indiana down into Kentucky. We had a quartermaster who was inexperienced, but a driving fellow, and wanted to personally manage everything pertaining to his department. I was a sergeant in one of the companies. As we marched along the forage was procured from

day to day from the surrounding country. Men were sent out from camp each evening with wagons and brought in great wagon loads of corn. There were twelve companies, and, when the wagons returned, twenty men and a sergeant were sent with saddle blankets from each company to receive the company's share of corn. On the evening of the first day after we started on this long march, it so happened I took the detail to bring the corn to the company. When we had all gathered at the appointed place the quartermaster insisted that the corn should first be put out of the wagons in one great pile. So two hundred and fifty of us non-commissioned officers and soldiers stood around waiting or helping until that was done. Then the quartermaster concluded that each horse, of which there were 1,200 in the regiment, should have ten ears at night and ten in the morning; and as, possibly, some of the non-commissioned officers did not know how to count or might make mistakes on their side and against him, it would be better for him to count it out himself. As I belonged to Company A, I was fortunate enough to be called up first to receive the 2,000 ears to which my company was entitled. The quartermaster commenced and counted and counted and counted. Military discipline required submission; but I noticed that the sergeants of L and M companies were not a little dismayed at the slow progress and the prospect of being detained until it was necessary to throw both the supper and breakfast of their horses into one meal. Before the quartermaster got through counting for my company the situation was relieved by the arrival on the ground of the lieutenant colonel of the regiment, who was an old and experienced officer of the Army, who instructed the quartermaster to let the sergeants count out the corn for their companies. So we quickly got our corn and were able to attend to our other duties.

General Grant, when President, parcelled out the Indians to the religious bodies of the country in that way; but they did not take hold of it. He gave to the different denominations separate tribes to work upon. He said to the Presbyterians: "You may have the Navajoes of Arizona, the Mescalero Apaches, and the Pueblo of New Mexico, the Nez Percés in Idaho; you may appoint the agents and all the employés, and through your agents you may control the management of the funds appropriated by Congress;" and to the Methodists, Congregationalists, Episcopalians, and others he assigned certain Indians and agencies. Many of these religious bodies failed most signally. There were some who took up the work fairly well, but some did nothing. None of them took hold of it with the energy they should have done. Foreign work, the salvation of the natives of Boriboola-Gha, was far more important than that of our native tribes. But we must get beyond great schools for Indians; through these they must go out into families and into our own schools, and so get the experiences and competitions that will enable them to live among us and be of us.

General S. C. ARMSTRONG, principal of the Hampton Normal and Agricultural Institute, Hampton, Va., was then called for, but had not arrived. Later in the session he submitted the following paper:

There are two views of the course to be pursued by Indians educated away from reservations, one being represented by the Carlisle and the other by the Hampton school.

Captain Pratt has forcibly presented his own, to the effect that education should promote the disintegration of the tribes, and that, to that end, Indian graduates should be encouraged to settle among white people, with whom Indians must eventually live, if they are to remain upon the face of the earth; that Indians thrown back to their old haunts are like recently captured and trained ponies put back with wild herds, with whom they will soon assimilate, and their last state be no better or even worse than their first; that to save our trained pupils they must be kept away from their people in savage or semi-savage life.

This view makes little of agency schools, emphasizing those amidst civilized surroundings as doing the only valuable and effective work.

My own view is that Indians at our eastern schools, who, to begin with, have a strong home and filial feeling and would seldom consent to settle permanently among strangers, should be taught that they have a duty to their people; that their education is more than a preparation for their own support and decent living; that they have a great work, which they must begin by writing home good advice (which in many cases has had good effect), and expect to return to teach by precept and by example a more excellent way.

Our Hampton pupils are already inspired with this idea; it is the staple talk of their meetings and runs through their compositions, little speeches, and short prayers.

The enthusiasm of the educator as well as of the educated is kindled by this thought. The former feels that his work will be germinant, to be probably repeated many times upon others by the pupil before him, who himself is stimulated by the thought of helping his own benighted people. I regard the idea of a *mission* in the mind of an Indian, negro, or any youth as a directive and helpful force of the greatest value in the formation of character.

Practically Carlisle and Hampton now work nearly in the same way, the students of both, after their schooling, going back to their homes to do the best they can.

To improve and to all appearances change radically for the better once wild Indian boys and girls is comparatively easy by bringing them to and teaching them in the midst of civilization; it is like throwing them into a stream that bears them along. Whatever the past may have done, I am satisfied, from experience, that present surroundings may overcome the power of heredity. So circumstances may even more easily drag them down; they go with the current.

Are the influences at home necessarily fatal? Can conditions be cre-

ated favorable enough for their salvation while they are with their people, thus making them object lessons in Christian civilization, which the Indians have so long and sadly needed? It is a matter of experiment or experience. I believe that it can be done.

To offset bad home influences three things will, I believe, in the majority of cases, suffice:

(1) Good Indian agents. "The difference in the condition of Indians at the reservations is the difference in their agents," said a competent observer.

When in 1881 I took back twenty-five boys and five girls, leaving about five apiece at six Sioux agencies between and including Yankton and Fort Berthold, Dakota, there was only one first rate agent among them all. Those left with him remained steadfast, not without some inconsistencies, due to the fickleness of Indian character, and are now employed in the Government service.

The rest, partly from the weakness, or worse, of the agents, made at first a less satisfactory record, but, on the whole, did remarkably well, though some were reported as having gone back to the blanket. But the leaven worked, better men were placed in charge, and now, in two and a half years, not over five out of the thirty are given up as hopeless; the majority are school teachers and mechanics in the public service. Three who graduated later have gone back to the Indian Territory. Of these two are teaching in responsible positions and one is a Government clerk and a successful cattle raiser. All did better the second year than the first. The best third of these trained youth had, I think, enough force of character to do well under disadvantages; the rest needed some parental care.

The Indian agent is called their "father." To the red man the white man is typified by the "father" in charge of him and the Great Father in Washington. The former, if competent and especially if sustained at Washington, has great power for good or evil and is to-day the great fact in the life of the Indian; to the educated youth who return to the reservation he is as important as the school that trained him. It is clear that Indian agents like Majors McLaughlin, Gassman, McGillicuddy, Riordan, Jackson, Llewellyn, at least a score in all, are able to hold up our returned boys and girls, unless the conditions are specially unfavorable, as when the lands are bad or their resources are cut off as the result of shortsighted legislation.

The present policy of paying small salaries to agents is against efficient service. Congress wishes the cheapest of everything; party record seems paramount to justice. The executive department hopelessly urges adequate pay for the responsible, difficult duties required. I consider it useless to work for some of the reservations on account of the inferior quality of the management.

(2) Schools at the agencies furnish an increasing field for work for returned Indians. The breaking up of tribal life and settlement on

limited areas (if not on lands of their own), which is not far off, will increase rather than diminish the educational work which public sentiment clearly demands and Congress more and more favors. Not only are they calling for class teachers, but for our graduate carpenters, blacksmiths, shoemakers, and harness makers.

Probably not over 6,000, five times as many as now, will ever be taught away from the reservations; the rest, not less than 30,000, will be trained, if at all, at their homes. Each field supplements and helps the other. In quantity the Western work is far ahead; in quality that at the East is far ahead, as a rule. Liberal expenditure may bring the former up to the highest standards. To illustrate their relations: Dr. Jackson, agent of the Pimas in Arizona, recently asked to have a dozen picked youth, out of the hundred at his agency boarding school, sent to Hampton to be fitted for teachers of book and mechanical knowledge, and they will be accepted if Government will aid in the matter. I think our specialty should be training teachers and mechanics. The agency schools can fit Indians to be farmers as well as we can, and the great majority must be farmers.

(3) The missionary is the other important factor in the life of the returned Indian. Like the agent, he should be a first rate man or he may be worse than useless. Weak missionaries are as bad for the cause as weak agents. The religious societies have made some mistakes in their selections.

In the mission fields of Bishop Hare, Rev. Dr. Williamson, and Rev. Theodore L. Riggs in Dakota, and others, our Indian graduates have found most helpful allies. Men like these have, after all, created, under God, the few bright spots in Indian life. Whatever have been their failures, the Christian churches of our country are the hope of the red race, whose existence is a question of morality and intelligence. Government is only incidentally Christian in its influence; it can fight, feed, or educate Indians, but will utterly fail of the needed moral results unless the religious forces of the country shall take hold and send their best men into the field. With capable and well sustained Indian agents and a proper missionary force on the ground, there need not be serious disaster to the Indian youth who return home from our eastern schools. I would not say this of all the reservations, but of many of them.

"All very well," it may be said, "but must the Government keep up an expensive system to give employment to these youths?"

It certainly will continue the school work. The reservations will ere long be broken up or much reduced and the shops closed. Yet, so far as Indians are (and not less than half of them are) on grazing lands, not arable ground, the entire value of which depends on access to water, homesteading in the usual way is out of the question; yet large numbers will receive lands in severalty. In this advancing stage will no shops or mechanics be needed to repair wagons and harnesses, shoe horses, and build houses? Nothing is more important than to establish a force

of Indian mechanics at once, in advance, if possible, of this radical change, whose intelligence, as well as skilled labor, will be indispensable to the welfare of their people in this crisis. Let Government abandon the workshops when it shall so choose; we can depend on a certain amount of wisdom and care in the matter. Nothing would be greater folly than to keep back skilled Indian labor from the reservations, which, if employed steadily in the agency shops, will improve till thrown upon itself.

The far West is the battleground of Indian civilization. White men's lust, avarice, and rum, besides their own besetting sins, make the issue doubtful. The easy affiliation of the races will lead, I believe, finally to the absorption of the Indian by the whites. Pure blood Indians are probably decreasing; mixed ones are increasing; and the name will finally be nominal, as it now is in so many cases in the Indian Territory and elsewhere.

All men, whether white or black or red, on our continent are engaged in a physical and moral struggle. Christian institutions can save them by training selected youths for their leaders. The annual reënforcement from schools and colleges sent yearly into the midst of this struggle is the hope of the races and of the nation.

Pour into Indian life men and women of better lives, living illustrations of what their people should be, create the conditions which will make manhood and citizenship possible, and there will be in a few years no Indian question.

Rev. Dr. McMurdy called attention to the good results following the emancipation of the Indian slaves in Brazil. They were not placed on reservations and in villages by themselves, but were given the rights and privileges of citizens. There have been no Indian wars; these former slaves have become peaceful citizens and are treated just as well as other Brazilians. In America the Indians have been taught first by one religious denomination and then by another, and this has created a confusion of ideas. The policy of General Grant of giving to each Indian settlement one religion and one only was very wise.

The discussion was then declared closed.

APPOINTMENT OF COMMITTEES.

Mr. Bicknell introduced the following preambles and resolution; which were adopted:

Whereas this Department at its annual meeting in 1882 and the National Educational Association at its annual meeting in 1883 memorialized Congress for education in Alaska; and

Whereas, in accordance with the above action, a bill providing for a government and education in Alaska has passed the United States Senate and is now before the House of Representatives: Therefore,

Resolved, That a committee of this association be appointed to wait on the Committee of the Territories of the House in behalf of the educational section of the bill.

The following gentlemen were appointed as this committee: Messrs. Bicknell, of Massachusetts; Jackson, of Alaska; De Graff, of the Dis-

trict of Columbia; Speer, of Kansas; Smith, of Minnesota; Sipe, of West Virginia; Coward, of South Carolina; Beattie, of New York; and Shelley, of Pennsylvania.

Dr. ORR moved that a special committee on legislation be appointed. The motion was carried and the following were named as this committee: Messrs. Orr, of Georgia; Wickersham, of Pennsylvania; Harris, of Missouri; Curry, of Virginia; Rogers, of Louisiana; Warner, of the District of Columbia; Bicknell, of Massachusetts; Rickoff, of New York; Scarborough, of North Carolina; Armstrong, of Alabama; Holcombe, of Indiana; and Coward, of South Carolina.

ARBOR DAY IN THE PUBLIC SCHOOLS.

ADDRESS OF HON. J. B. PEASLEE.

The next subject upon the program being called for, the president read a telegram from Hon. JOHN B. PEASLEE, of Cincinnati, saying that at the last moment he found that, owing to the floods, he should not be able to reach Washington in time to read his paper. The manuscript was, however, forwarded by mail, and is here presented:

The time has come when the people of Ohio[1] must wake up to the importance of preserving their forests and of planting trees, or the State will suffer the terrible consequences of their neglect before another century has passed away. Hon. Emil Rothe, who has given the subject much study, in speaking of Ohio before the American Forestry Congress at Cincinnati, in 1882, said: "Let the hills be deprived of the rest of the protection which the forests afford, and half of our State will be sterile in less than fifty years."

"The wealth, beauty, fertility, and healthfulness of the country," as Whittier justly says, "largely depend upon the conservation of our forests and the planting of trees." How can these truths be impressed most effectively upon the minds of our people? In the first place, forestry associations should be organized in every city, town, village, and country school district in the State, whose object shall be to plant trees along the streets, by the roadsides, in parks and commons, around public buildings, in waste places, to distribute information in regard to trees and forestry among the people, and to encourage tree planting in every way possible. These associations, in conjunction with the public schools, should hold tree planting celebrations from year to year, and in places where such associations are not formed the schools should hold arbor celebrations of their own. The youth of the State must be instructed in the value and utility of forests, their influence upon climate, soil, productions, &c.; correct sentiments in regard to trees must be implanted in them if the best interests of our State in regard to forestry are to be subserved. And the most impressive and attractive means of imparting the instruction and of interesting the children in the subject is

[1] I have thought it best to write this paper with reference to my own State, Ohio, feeling that what applies to this State applies in general to all the States.

through the celebration of tree planting; it is also the surest and best way of calling the attention of the public at large to it. It is therefore especially desirable that the section of the forestry bill, introduced into the State legislature last year, which designates the last Friday in April as arbor day and makes it a holiday for all public schools that take part in the celebration of tree planting, should become a law. A law containing a similar provision should be passed by every State legislature in the country. The last Friday of April is too late to plant trees in the southern part of the State, but the celebration will be just as effective if the trees are planted previously and the ceremonies performed on that day. The most important thing to be gained by the celebration is not the number of trees planted on these occasions, but the instilling into the minds of the children and older people correct sentiments in regard to trees and the storing of their minds with information relating to forestry and to the distinguished persons in whose honor or memory each tree or group is planted; for I would have all the trees around which the celebrations take place dedicated to great authors, statesmen, soldiers — in brief, to famous men and women whose lives have reflected honor upon our country, to the pioneers and distinguished citizens of each township, village, or city—and thus "make trees," as Holmes says, "monuments of history and character."

In every place where sufficient grounds can be obtained, either in public parks or elsewhere, I would have memorial groves planted and the arbor day celebrations take place in them. Let there be a "Citizens' Memorial Grove," in which trees shall be planted from year to year by loving hands of relatives and friends of those who have died; let there be a "Pioneer Grove," in which all citizens, young and old, shall annually join in paying just tribute to the memory of those who endured the hardships and privations of a pioneer life.

> They vanish from us, one by one,
> In death's unlighted realm to sleep;
> And oh! degenerate is the son
> Who would not some memorial keep.

Let there be an "Authors' Grove," in which the school children shall honor by living monuments the great men and women in American literature, so that while they learn to love and reverence trees they will at the same time become interested in the lives and writings of our distinguished and worthy authors; let there be a "Soldiers' Grove," devoted to the memory of our patriotic dead. Yes,

> Plant beautiful trees in honor of those
> Whose memory you revere,
> And more beautiful still they'll become
> With each revolving year.

Should the annual celebration of planting memorial trees, the preparation for which affords ample opportunity for imparting all needful information in regard to trees and forestry, become general in our State,

the time would not then be far distant when such a public sentiment would be formed as would lead to the beautifying by trees of every city, town, and village in Ohio, as well as the public highways, church and school grounds, and the homes of the people in the country. In truth, within the next twenty-five years the general aspect of many parts of the State would be changed, as has been that of Connecticut within the last few years through the instrumentality of her schools, under the leadership of Hon. B. G. Northrop, and of her improvement societies, which have been organized through his influence.

Pastor Oberlin, after whom Oberlin College is named, required each boy and girl, before he would administer the ordinance of confirmation, to bring a certificate that he or she had planted two trees. If but the youth of Ohio could be led to plant their two trees each, how by the children alone could our great State be enriched and beautified within the next fifty years.

In order to indicate the character and scope of arbor day celebrations,[1] I will give a brief description of the celebrations held by the public schools of Cincinnati in Eden Park.

At the request of the projectors of the American Forestry Congress, which was organized in Cincinnati in the spring of 1882, Governor Foster issued a proclamation in which he designated Friday, April 27, of that year, as arbor day and called upon the people of Ohio to devote the day to tree planting. Acting in the spirit of the governor's proclamation, the board of education of that city decided, by a unanimous vote, to dismiss the schools for two days—April 27 and 28—thus giving the teachers and pupils an opportunity of participating in the tree planting on arbor day and of attending the remaining exercises of the congress.

A meeting of the principals of the schools and of the special superintendents of music, drawing, and penmanship was called, at which it was decided that each school and department should select an author in whose honor or memory that school or department should plant a group of trees. About six acres were set apart in the park for the grove, to be known as "Authors' Grove." Selections on trees and forestry from various authors were sent to the several schools to be memorized by the pupils; also, information concerning historic trees of our own and other countries and many facts of history, giving the effects upon climate, soil, productions, &c., both of the destruction of forests and of their renewal, were given the schools. These formed the basis of compositions in the upper grades.[2] In addition to the above, the teachers of the several

[1] The part of this paper which gives the history and description of the celebrations is taken largely from my last two annual reports of the Cincinnati schools and from articles written for educational journals. My reason for reproducing the matter here is that many who hear this paper read, or into whose hands it will come, have had no opportunity to read my reports or the articles referred to.—J. B. P.

[2] The Ohio State Forestry Association has appointed a committee, of which I am chairman, to prepare a pamphlet containing exercises for tree planting celebrations, which the society intends to distribute to all parts of the State before next arbor day.

schools gave sketches of the lives of their respective authors and the pupils learned selections from their writings. In some of the schools the boys were organized into companies under the name of forestry cadets, as the "Emerson Forestry Cadets," of the Hughes high school; the "Longfellow Forestry Cadets," of the eleventh district school; the "Holmes Forestry Cadets," of the twenty-second district school. The girls and boys not organized were called foresters, as the "Whittier Foresters," of the twenty-sixth district school; the "Franklin Foresters," of the tenth district school, and so on.

That the part that the pupils actually took in the planting may not be misunderstood, I will state that experienced tree planters did most of the work of setting out the trees previous to arbor day and that the children finished the setting by filling around each tree soil left in heaps for this purpose. On arbor day, authors' grove was distinguished from the others (pioneer grove, battle grove, centennial grove, Presidents' grove, citizens' memorial grove, for the celebration of tree planting was going on at the same time in all these groves) by a large blue flag placed near the center of the grove and by small flags of the same color placed around the grove. At a given signal the pupils, upwards of seven thousand in number (at the celebration last year there were more than 17,000), arranged themselves, each school around its special authors' group, and the exercises began. In general, the exercises consisted of reading by selected pupils their compositions on forestry; of reciting individually and in concert the selections on trees; of giving sketches of the lives and writings of chosen authors; of declaiming extracts from their works; of reading letters[1] from living authors whom the schools

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[1] A few of the letters are given here, as they are more important than any words of mine:

[From Oliver Wendell Holmes.]

BOSTON, MASS., *March* 18, 1883.

MR. JOHN B. PEASLEE.

DEAR SIR: You and your friends have chosen a very pleasant and most useful way of commemorating some of the authors whom you think worthy of being remembered by their fellow countrymen. I hope that the example set of planting trees as their monuments will do as much for American landscape as the best of our authorship has done for American literature.

The trees may outlive the memory of more than one of those in whose honor they were planted. But if it is something to make two blades of grass grow where only one was growing, it is much more to have been the occasion of the planting of an oak which shall defy twenty scores of winters or of an elm which shall canopy with its green cloud of foliage half as many generations of mortal immortalities. I have written many verses, but the best poems I have produced are the trees I planted on the hillside which overlooks the broad meadows, scalloped and rounded at their edges by loops of the sinuous Housatonic. Nature finds rhymes for them in the recurring measures of the seasons. Winter strips them of their ornaments and gives them, as it were, in prose translation, and summer reclothes them in all the splendid phrases of their leafy language.

What are these maples and beeches and birches but odes and idyls and madrigals? What are these pines and firs and spruces but holy hymns, too solemn for the many-hued raiment of their gay deciduous neighbors?

But I must not let my fancy run away with me. It is enough to know that when we plant a tree we are doing what we can to make our planet a more wholesome and happier dwelling place for those who come after us if not for ourselves.

As you drop the seed, as you plant the sapling, your left hand hardly knows what your right hand is doing. But nature knows, and in due time the power that sees

were celebrating and from the relatives and friends of those who have passed away; of singing; of appropriate talks by teachers and others; and of the ceremony of throwing the soil, each pupil in turn, about the trees. At the expiration of the time allotted to this part of the program, the pupils came together and, assisted by instrumental music, sang our national songs and others appropriate to the occasion. After this the pupils were dismissed to enjoy themselves in their own manner in the great park. Thus ended what perhaps were the most interesting

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and works in secret will reward you openly. You have been warned against hiding your talent in a napkin; but, if your talent takes the form of a maple-key or an acorn and your napkin is a shred of the apron that covers "the lap of the earth," you may hide it there unblamed, and when you render in your account you will find that your deposit has been drawing compound interest all the time. * * *

Believe me, dear Mr. Peaslee, very truly, yours,

OLIVER WENDELL HOLMES.

[From J. T. Headley, historian.]

NEWBURGH, N. Y., *March* 30, 1883.

Mr. JOHN B. PEASLEE.

DEAR SIR: It is gratifying to see Ohio take such deep interest in tree planting, which is beginning so strongly to attract public attention. Setting apart one day for this purpose, and making it a general holiday, will add attractiveness to utility and give it a deeper hold on the popular heart. But the happiest thought of all was to make it a holiday for the public schools and have the children practically take part in it and set out groups of trees for their favorite authors. You thus not only connect trees with the associations of childhood and their pleasantest holidays, but with authors from whom they receive their earliest and best impressions.

We sometimes forget that the highest aim of education is to form right character; and that is accomplished more by impressions made upon the heart than by knowledge imparted to the mind.

The awakening of our best sympathies, the cultivation of our best and purest tastes, strengthening the desire to be useful and good, and directing youthful ambition to unselfish ends, such are the objects of true education. Surely nothing can be better calculated to procure these ends than the holiday you have set apart for the public schools.

Yours, very truly,

J. T. HEADLEY.

P. S.—I see by your plan of "moral instruction" and for "beautifying school rooms" that you agree with me that education consists as much in making good impressions as imparting intellectual knowledge. H.

[From Benson J. Lossing, historian.]

"THE RIDGE," DOVER PLAINS, DUTCHESS COUNTY, N. Y., *April* 9, 1883.

MY DEAR SIR: What conqueror in any part of "life's broad field of battle" could desire a more beautiful, a more noble, or a more patriotic monument than a tree planted by the hands of pure and joyous children as a memorial of his achievements?

What earnest, honest worker with hand and brain for the benefit of his fellowmen could desire a more pleasing recognition of his usefulness than such a monument, a symbol of his or her productions, ever growing, ever blooming, and ever bearing wholesome fruit?

Trees already grown ancient have been consecrated by the presence of eminent personages or by some conspicuous event in our national history, such as the elm tree at Philadelphia, at which William Penn made his famous treaty with nineteen tribes of barbarians; the charter oak at Hartford, which preserved the written guarantee of the liberties of the colony of Connecticut; the widespreading oak tree of Flushing, Long Island, under which George Fox, the founder of the Society of Friends or Quakers, preached; the lofty cypress tree in the Dismal Swamp, under which Washington reposed one night in his young manhood; the huge French apple tree near Fort Wayne, Ind., where Little Turtle, the great Miami Chief, gathered his warriors; the elm tree at Cambridge, in the shade of which Washington first took command of the Continental Army on a hot summer's day; the tulip tree on King's Mountain battlefield in South Carolina, on which ten bloodthirsty tories were hung at one time; the tall pine tree at Fort Edward, N. Y., under which the beautiful Jane McCrea was slain; the

and profitable lessons the pupils ever had in a single day; for, in participating in the planting of this grove, they have not only obtained a better knowledge of American authors and their works, but have learned to care for and protect forest trees. Besides, the importance of forestry has been impressed upon the mind of thousands of children by the celebrations, few of whom knew before of such a subject. The notice of parents also was attracted to it.

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magnificent black walnut tree, near Haverstraw, on the Hudson, at which General Wayne mustered his forces at midnight, preparatory to his gallant and successful attack on Stony Point; the grand magnolia tree near Charleston, S. C., under which General Lincoln held a council of war previous to surrendering the city; the great pecan tree at Villere's plantation, below New Orleans, under which a portion of the remains of General Pakenham was buried; and the pear trees planted, respectively, by Governor Endicott, of Massachusetts, and Governor Stuyvesant, of New York, more than two hundred years ago.

These trees all have a place in our national history and are inseparable from it because they were so consecrated. My eyes have seen all but one of them, and patriotic emotions were excited at the sight. How much more significant and suggestive is the dedication of a young tree as a monument.

The memorial trees which the children of Cincinnati planted in Eden Park—Eden! wherein man's hand first planted a tree. It was the beginning of temple building for the worship of the "Unknown God." Your children are fashioning a magnificent fane, such as was used for worship in the youthhood of the human race, for, as our beloved Bryant says:

> The groves were God's first temples. Ere man learned
> To hew the shaft, and lay the architrave,
> And spread the roof above them—ere he framed
> The lofty vault, to gather and roll back
> The sound of anthems; in the darkling wood,
> Amid the cool and silence, he knelt down,
> And offered to the Mightiest solemn thanks
> And supplication.

Please convey my thanks especially to the young people who have honored me by planting a group of trees dedicated to me, and accept my kindest salutation for yourself and your associates.

Most sincerely, your friend,

BENSON J. LOSSING.

Mr. JOHN B. PEASLEE, *Cincinnati, Ohio.*

[From Moncure D. Conway.]

LONDON, *March* 29, 1883.

DEAR SIR: It is a great pleasure to me to think of the young people of Cincinnati assembling to celebrate the planting of trees and connecting them with the names of authors whose works are the further and higher products of our dear old mother Nature. An oriental poet says of his hero:

> Sunshine was he in a wintry place,
> And in midsummer, coolness and shade.

Such are all true thinkers, and no truer monuments of them can exist than beautiful trees. Our word book is from the beech tablets on which men used to write. Our word Bible is from the Greek for bark of a tree. Our word paper is from the tree papyrus — the tree which Emerson found the most interesting thing he saw in Sicily. Our word library is from the Latin *liber*, bark of a tree. Thus literature is traceable in the growth of trees, and was originally written on leaves and wooden tablets. The West responds to the East in associating great writers with groups of trees, and a grateful posterity will appreciate the poetry of this idea as well, while it enjoys the shade and beauty which the schools are securing for it.

Yours truly,

MONCURE D. CONWAY.

[From Prof. William A. Mowry, PH. D.]

PROVIDENCE, *April* 5, 1883.

JOHN B. PEASLEE, PH. D.

MY DEAR SIR: The experience of the Cincinnati schools will illustrate the importance of acquainting the youthful mind with our best authors and their productions.

In giving a description of the celebration on last arbor day, April 27, 1883, one of the Cincinnati daily papers said:

The east ridge of the park was thronged with associations planting tablets; many of the groups of trees planted the year before were marked last year by small granite stones properly engraved, to the memory of the Presidents of the United States, the heroes of Valley Forge, and the pioneers of Cincinnati, in their respective groves, while the northern projecting slope of the ridge was occupied by fully 17,000 children in honoring authors' grove. Viewed from the summit of the ridge immediately west the sight was one of the most animating ever brought before the eyes of Cincinnatians.

The entire ridge, nearly a third of a mile in length, was occupied by those persons taking part in the first-named ceremonies, while the slope designated was occupied by a dense mass of gayly dressed children in active motion over a surface of about six acres, and whose voices, wafted across the deep hollow to the western ridge, sounded like the chattering from a grove of happy birds. The eastern slope of the west ridge was occupied by 1,500 or 2,000 spectators, who, reclining on the green spring sod of the grassy slopes, quietly surveyed the scene from a distance.

The sentiment of the scholars in regard to trees, which is one of the direct results of the celebrations, is clearly indicated by the fact that though there were thousands of children in Eden Park on arbor day of both years not one injured a tree in any manner. In contrast to this a prominent writer for one of the leading journals of England, in an article strongly advocating the adoption by the public schools of Great Britain of the Cincinnati plan of celebrating tree planting, said that in Epping Park on every public holiday the authorities employ a large

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I believe it is well agreed, also, that truths and facts are more firmly impressed upon the mind by object lessons than by any other means. Moreover, the planting of trees and the cultivation of forests are but just beginning to be appreciated by our people as matters of great importance.

I conceive, therefore, that you have instituted one of the best educational projects of the age in organizing and carrying forward in a systematic manner the planting of trees in the public parks by the school children, attended by appropriate intellectual exercises, especially including the recitation of selections from these authors' best thoughts. Attended as these exercises will be with the parade and ceremony of a celebration and with the attraction and pleasures to the young minds of a holiday, the exercises and what they symbolize will be deeply stamped upon the memory of the school children, and the entire effect upon them must prove to be of the most important and satisfactory character. I congratulate you and the children of your beautiful city on the inauguration of this excellent custom, and cannot but believe it will be widely followed by the cities of our country.

Very respectfully, yours,

WILLIAM A. MOWRY.

[Extract from letter of B. Pinckman Mann, son of Horace Mann.]

The project of connecting the planting of trees with the names of authors is a beautiful one, and one certain to exert a beneficial influence upon the children who participate in these exercises. The institution of an arbor day is highly commendable from its artistic consequences, and cannot fail to result in great benefit to the climate and to the commercial interests of the country when it becomes an institution of general adoption. I was gratified to see the name of my father in your sketch and in your report to which you called my attention.

[Letter from Susan Fenimore Cooper, daughter of James Fenimore Cooper.]

COOPERSTOWN, *April* 12, 1883.

DEAR SIR: I have to thank you for your letter of last month, which I have read with much interest. The subject of forestry is one in which I have been very deeply interested for many years. In a volume on country life, published long since under

force of special policemen to keep people from wantonly injuring and destroying the trees, and that, notwithstanding all the care and precaution taken to prevent it, many trees are mutilated on all these public days.

The Ohio State Forestry Association, recognizing the fact that the schools of the State must become one of the most powerful agents in carrying out the objects of the association, prepared a circular addressed to the trustees, superintendents, and teachers of Ohio schools, requesting them to have the schools under their charge celebrate arbor day with appropriate ceremonies. Previous to that day the circular was sent to all parts of the State and to many places outside of Ohio. It gives me great pleasure to say that many schools in and out of the State celebrated arbor day, and that as a consequence thousands of trees were planted and tens of thousands of school children outside of Cincinnati received instruction on and became interested in trees. Hon. B. L. Butcher, State superintendent of free schools of West Virginia, issued instructions to the city and county superintendents and to the teachers of his State to celebrate tree planting on last arbor day, April 27. This movement was supported by the entire public press of that State. One number of the West Virginia School Journal, of which Mr. Butcher is one of the editors, was devoted exclusively to this subject. And on arbor day the schools of all parts of the State, assisted by thousands of public spirited citizens, planted trees in the school grounds, by the roadside, around the homes of the children, and dedi-

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the title of Rural Hours, I already deplored the extravagant and senseless destruction of trees in our country, not only wild forests, but lesser woods and groves and single trees of unusual beauty. There has been really a recklessness on this subject which may be called barbarous and utterly unworthy of the civilization on which we pride ourselves. But, most happily, our people appear to be awakening to the vast importance of this question in different parts of the country. Some twenty years since a Village Improvement Society was organized in this neighborhood, whose object was the same in spirit as the noble Arbor Society of Ohio: the planting of trees for shade and ornament in the streets, near the gateways, in waste spots such as are found in every neighborhood, about springs, wells, and other positions where they would form pleasing groups, living pictures as it were, and the preservation of trees of more than common beauty and interest; all these entered into the work of the Improvement Society.

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I thank you for including my father's name in your authors' grove. He was deeply interested in forestry, and set out himself, or under his close supervision, hundreds of trees in this neighborhood. Wishing you success on arbor day, believe me, dear sir, very sincerely yours,

SUSAN FENIMORE COOPER.

JOHN B. PEASLEE,
Superintendent of Public Schools, Cincinnati.

[Extract from a letter of Mrs. Mary H. Russell, daughter of Mrs. Sigourney.]

I desire to express to you, and through you to the twelfth district school, my appreciation of the memorial to my mother, Mrs. Sigourney, and to say what a peculiar interest she felt in this work of planting trees. She used often to speak with great admiration of the patriotism of her friend the Hon. James Hillhouse, of New Haven, who beautified that city by planting with his own hand the elms which have since made it famous; and when she was notified, many years ago, that a young town in Iowa had been called Sigourney in her honor, she sent a sum of money to be expended in shade trees to ornament its public square. There seems a peculiar fitness in these living monuments to those whose names we would still keep with us, now that their bodily presence has departed, and I trust that the trees may flourish and prosper and keep green many years the memory of each one for whom they have been planted

cated them to authors, statesmen, soldiers, and distinguished citizens. The day was celebrated in a similar manner in many places in other States. I mention these facts to show that what I advocate is entirely practicable and that it will be readily taken up when properly presented to our people.

The trees which the children plant or which they assist in dedicating will become dearer to them as year after year rolls on. As the trees grow and their branches expand in beauty so will the love for them increase in the hearts of those by whom they were planted or dedicated, and long before the children reach old age they will almost venerate these green and living memorials of youthful and happy days. And as those who have loved and cared for pets will ever be friends of dumb animals, so will they be the friends of our forest trees. From the individual to the general is the law of our nature. Show me the man who in childhood had a pet and I will show you a lover of animals; show me the person who in youth planted a tree which has lived and flourished and I will show you a friend of trees and of forest culture. In this I speak from personal experience. The pets I had when a child led me to join the Society for the Prevention of Cruelty to Animals. The trees I planted in early boyhood in front of my old New England home have brought me before you to-day as the advocate of tree planting and arbor day celebrations. In further illustration of what I have just said, I will relate an incident in the lives of Alice and Phœbe Cary, Ohio's greatest daughters. In 1832, when Alice was twelve years old and Phœbe only eight, as these little girls were returning home from school one day, they found a small tree which a farmer had "grubbed" up and thrown into the road. One of them picked it up and said to the other: "Let us plant it." As soon as said these happy children ran to the opposite side of the road, and with sticks, for they had no other implement, they dug out the earth, and in the hole thus made they placed the treelet; around it with their tiny hands they drew the loosened mold and pressed it down with their little feet. With what interest they hastened to it on their way to and from school to see if it were growing, and how they clapped their little hands for joy when they saw the buds start and the leaves begin to form; with what delight did they watch it grow through the sunny days of summer; with what anxiety did they await its fate through the storms of winter; and, when at length the longed for spring came, with what feelings of mingled hope and fear did they seek again their favorite tree. But I must not pursue the subject further. It is enough to know that after these two sisters had grown to womanhood and removed to New York City they never returned to their old home without paying a visit to the tree that they had planted and that was scarcely less dear to them than the friends of their childhood days. They planted and cared for it in youth, they loved it in age. That tree is the large and beautiful sycamore which one sees in passing along the

Hamilton pike between College Hill and Mount Pleasant, Hamilton County, Ohio.

It was the custom of our New England ancestors to plant trees in the early settlement of our country and dedicate them to liberty. Many of these liberty trees, consecrated by our forefathers, are still standing. I remember when a boy the interest I felt in the Old Liberty Elm that then stood in Boston Common. That old tree was planted by a schoolmaster long before the revolutionary war and dedicated by him to the independence of the Colonies. Around that tree, before the Revolution, the citizens of Boston used to gather to listen to the advocates of our country's freedom; around it during the war they met to offer up prayers and supplications to Almighty God for the success of the patriot armies; and, after the terrible struggle had ended, the people were wont to assemble from year to year in the shadow of that old tree to celebrate the liberty and independence of our country. It stood there till within a few years, a living monument of the patriotism of the citizens of Boston. The sight of that tree awakened patriotic emotions in every true American heart. And when at last that old tree fell the bells in all the churches in Boston were tolled and a feeling of sadness spread over the city and State; even in Ohio there were eyes that moistened with tears when the news came that Old Liberty Elm had fallen in a storm. Such was the veneration in which it was held. Another of these liberty elms now stands in Cambridge, Mass. Under the shade of this venerable tree Washington first took command of the Continental army, July 3, 1775. How the affection of every lover of his country clings around that tree! What care has been taken of it, what marks of esteem have been shown it by the citizens of Cambridge, may be judged by those who have seen it standing, as it does, in the centre of a great public thoroughfare, its trunk protected by an iron fence from injury by passing vehicles, which for more than a century have turned out in deference to this monarch of the Revolution. A few other famous trees of this country, not named in the letter of the historian Lossing, are given here. The Burgoyne elm, at Albany, N. Y.: This tree was planted on the day the British general, Burgoyne, was brought a prisoner into Albany, the day after the surrender. The weeping-willow in Cop's burying ground, near Bunker Hill: This willow, grown from a branch taken from the tree that shaded the grave of Napoleon at St. Helena, now waves over that of Cotton Mather, so noted in Salem witchcraft. Cop's burying ground is so near where the battle was fought that a number of gravestones can be seen to-day which were pierced through by bullets fired by British soldiers in that battle. The ash trees planted by General Washington at Mount Vernon: These ashes form a beautiful row of immense trees, which are the admiration of all who visit the home of the "Father of his Country."

Dear as these trees become to those who plant or dedicate them, they will be dearer still to their descendants. This is beautifully illustrated

in the incident which led George P. Morris to write that touching little poem entitled "Woodman, spare that tree." In a letter to a friend, dated New York, February 1, 1837, inclosing the manuscript of the poem, Mr. Morris gave in substance the following account of the way in which he came to write it:

Riding out of town a few days since in company with a friend—an old gentleman, who was once the heir expectant of a large estate in America, but over whose worldly prospects a blight has recently come—he invited me to turn down a little romantic woodland pass not far from Bloomingdale. "Your object?" inquired I. "Merely to look once more at an old oak tree which my grandfather planted long before I was born, and under which I played when a boy and where my sisters played with me; under its branches I often listened to the good advice of my parents. Father, mother, sisters, all are gone now; only that tree remains;" and a paleness overspread his fine countenance and tears came to his eyes. After a moment's pause he added, "Don't think me foolish; I don't know how it is; I never ride out but I turn down this lane to see that old tree. I always greet it as a familiar and well remembered friend." These words were scarcely uttered when the old gentleman cried out, "There it is." Near it stood a man sharpening his axe, getting ready to cut down the tree. "You surely are not going to cut that tree, are you?" asked the old gentleman with great anxiety. "Yes, but I am, though." "What for?" inquired the old gentleman with deep emotion. "What for? I like that! Well, I'll tell you: I want it for firewood," replied the woodman. "Then what is it worth for firewood?" "Why, when down, about ten dollars." "Suppose I should give you that sum, would you let it stand?" "Yes." "You are sure of that?" "Positive." "Then give me a bond." We then got out of the buggy and went into the little cottage near by, in which the old gentleman was born, but which now belonged to the woodman. I drew up the bond, the woodman signed it, and the money was paid over. We left the place with the assurance from the young girl, the woodman's daughter, that the tree should stand as long as she lived.

This circumstance made a strong impression on my mind and furnished me with the materials for the song I send you:

Woodman, spare that tree!
  Touch not a single bough!
In youth it shelter'd me,
  And I'll protect it now.
'Twas my forefather's hand
  That placed it near his cot;
There, woodman, let it stand,
  Thy axe shall harm it not!

That old familiar tree,
  Whose glory and renown
Are spread o'er land and sea,
  And wouldst thou hew it down?
Woodman, forbear thy stroke!
  Cut not its earth bound ties;
Oh, spare that aged oak,
  Now towering to the skies.

When but an idle boy
  I sought its grateful shade;
In all their gushing joy
  Here, too, my sisters played.
My mother kiss'd me here;
  My father press'd my hand—
Forgive this foolish tear,
  But let the old oak stand.

My heartstrings round thee cling,
Close as thy bark, old friend!
Here shall the wild bird sing,
And still thy branches bend.
Old tree! the storm still brave!
And, woodman, leave the spot;
While I've a hand to save,
Thy axe shall harm it not!

ADDRESS OF HON. B. G. NORTHROP, LL. D.

Hon. B. G. Northrop then delivered the following address:

An Arbor Day has just been appointed for the schools of Indiana under the most favorable auspices. At the annual meeting of the teachers of this State in Indianapolis, last December, an efficient committee was appointed to secure the coöperation of scholars, teachers, and school superintendents in the observance of such a day. State Superintendent Holcombe, who is chairman of this committee, is giving his personal and official influence heartily to this work. Lectures on this subject given on his invitation in different parts of the State were fully reported by the press, for the newspapers of Indiana cordially coöperated in this movement. It was my privilege also to address the State board of agriculture, which promptly passed a resolution commending the observance of Arbor Day. The State board of horticulture took an active part in this movement. Governor Porter gave it his official sanction and issued an address to the people of the State, in which he predicted that the appointed day would be a memorable one and "the beginning of a movement for a much more extended system of tree culture and the restoration of the varieties of trees, useful and beautiful, which have been so recklessly sacrificed that nature cries aloud for redress." He concluded his paper by calling on "the teachers to do all in their power to make Arbor Day a day of the most ardent and inspiring interest." A pamphlet containing practical suggestions from the Arbor Day committee and the State officials above named was widely circulated through the State. Such preparations assure the best results.

It may be objected to arbor day, or to any school lessons on forestry, that the course of study is already overcrowded. I reply that the requisite talks on trees, their value and beauty, need not occupy three hours, all told. Those talks on this subject which, Superintendent Peaslee says, were the most interesting and profitable lessons the pupils of Cincinnati ever had in a single day occupied only the morning of arbor day, the afternoon being given to the practical work. Such talks will lead our youth to admire our noble trees and realize that they are the grandest products of nature and form the finest drapery that adorns this earth in all lands. Thus taught they will wish to plant and protect trees, and find in their own happy experience that there is a peculiar pleasure in the parentage of trees, whether forest, fruit, or ornamental, a pleasure that never cloys, but grows with their growth. Like grate-

ful children, trees bring rich filial returns and compensate a thousandfold for all the care and pains they cost. This love of trees, early implanted in the school and fostered in the home, will make our youth practical arborists.

Tree planting is fitted to give a needful lesson of forethought to the juvenile mind. Youth too often sow only where they can quickly reap. A meagre crop soon in hand outweighs a golden harvest long in maturing. They should early learn to forecast the future as the condition of wisdom. Arboriculture is a constant discipline in foresight: it is always planting for the future, and sometimes for the distant future.

Teachers can easily interest their pupils in adorning the school grounds. With proper prearrangement as to the selection and procuring of trees, vines, or shrubs, arbor day may accomplish wonders. Many hands will make merry, as well as light, work. Such a holiday will be an attractive occasion of social enjoyment and improvement. The parents should be persuaded to approve and patronize the plan. It tends to fraternize the people of a district when they thus meet on common ground and young and old work together for a common object, where all differences of rank, or sect, or party are forgotten. The plantings and improvements thus made will be sure to be protected. They will remain as silent, but effective, teachers of the beautiful to all the pupils, gradually improving their taste and character.

Such work done around the school naturally extends to the homes. You improve the homes by improving the schools as truly as you improve the schools by improving the homes. "The hope of America is the homes of America." It has long been my ambition to improve the homes and home life of our industrial classes and help them to realize that the highest privilege and central duty of life is the creation of happy homes, for the home is the chief school of virtue, the fountain head of individual and national strength and prosperity. It is a worthy ambition to surround one's home and children with such scenes and influences as shall make the everyday life and labors brighter and happier, and help one to go sunny and singing to his work. Our youth should early share in such efforts for adorning the surroundings of their homes and planting trees by the wayside.

How attractive our roads may become by long avenues of trees. This is beautifully illustrated in many countries of Europe. In France, for example, the government keeps a statistical record of the trees along the public roads. The total length of public roads in France, as last reported, is 18,750 miles, of which 7,250 are bordered with trees, while 4,500 miles are now being planted or are soon to be planted. The number of trees already planted is 2,678,603, consisting principally of elms, poplar, acacia, plane, ash, sycamore, and lime trees. Growing on lands otherwise running to waste, such trees would yield ample returns. The shade and beauty would be grateful to the traveller, but doubly so to the planter. Having in abundance the best trees for the

roadside, no class can contribute so much to the adornment of our public roads as the farmers. In portions of Germany the land owner was formerly required to plant trees along his frontage. Happy would it be for us if our sovereigns of the soil would each make such a law for himself. On the Indiana arbor day let every teacher and every scholar over 10 years of age, and through the combined influence of teacher and scholar each parent, devote that one day to school and home improvements, and grand results will be accomplished. When, in any community, each citizen is stimulated to make his own grounds and wayside neat and attractive, the entire town becomes so inviting as to give new value to its wealth and new attractions to all its homes.

A brief history of arbor day may increase the interest in the work proposed in Indiana, Wisconsin, and other States. In March, 1881, the legislature of Michigan requested the governor to appoint an arbor day and invite the people of the State to devote it to the planting of trees. Such an appointment was accordingly made in April following and has been repeated each succeeding April, and, as I am officially informed, with the happiest results. For the last two years a similar day has been appointed by the governor of Ohio. Many schools, especially those of Cincinnati and Columbus, fitly kept the designated day. Superintendent Peaslee, of Cincinnati, says: "The forenoon of that day was spent by the teachers in talks and by the pupils in reading compositions and selections upon trees, their proper care and uses, and in giving biographical sketches of persons in honor of whom the trees were planted. The importance of forestry was then impressed upon the minds of thousands of children, who thus learned to care for and protect trees. Not one of these 20,000 children in Eden Park on arbor day injured a single tree." They were encouraged by the many letters sent them by such eminent authors as Whittier and Holmes, commending their arbor day plan.

The American Forestry Congress, at its session in St. Paul last August, recommended the appointment of an arbor day in all our States and the British provinces of Canada, the congress comprising many delegates from the Dominion. The lieutenant governor of the Province of Quebec appointed an arbor day last spring, and the council of public instruction seconded this movement and recommended that the designated time be kept as a holiday and devoted to planting trees on school and other grounds. The official "proclamation," widely circulated, gave instructions for the selection and planting of trees and predicted that arbor day will become one of the institutions of "the country," in which our "boys and girls will take an eager share and genuine pleasure, and thus gain a liking for trees that will never be effaced."

Nebraska has the honor of originating arbor day. Some ten years ago, at the request of its State board of agriculture, the governor appointed the second Wednesday in April as the day to be devoted to economic tree planting, and it is stated that 12,000,000 trees were

planted on that day. The successive governors have continued thus to recognize this day. The schools last spring adopted the Cincinnati plan of planting memorial trees. The State board of agriculture annually awards liberal prizes for the greatest number of trees planted by any one person on that day. Nebraska is the banner State for economic tree planting, having over 107,000 acres of cultivated woodland. Her example has been closely followed by Kansas, which now claims over 100,000 acres similarly planted. In that State arbor day was first observed in Topeka, when the citizens cordially responded to the proclamation of the mayor and filled the public grounds with trees. The governors of the State have since issued annual proclamations for arbor day, and it has been widely observed by teachers and scholars in adorning school grounds as well as in economic tree planting. The arbor day in Minnesota, first observed in 1876, resulted, it is said, in planting over a million and a half of trees on that one day. A year ago the State school superintendent of West Virginia appointed the 27th of April as arbor day, inviting the coöperation of the teachers, parents, pupils, and school officers in planting trees on the grounds of their schools and homes. The April issue of the State School Journal was made an "arbor number," containing eleven articles on this subject by such men as Cassius M. Clay and Superintendent Peaslee (with an introductory paper by myself), and circulated gratuitously and widely. The press of the State strongly encouraged this practical movement. The good work done on the day appointed far exceeded the expectations of State Superintendent Butcher. It proved, as intended, a memorable day for the homes as well as the schools. Probably more trees and shrubs were then planted on school and home grounds than ever before on any one day in any State. The superintendent has decided to appoint another arbor day this spring. This successful example is worthy of imitation, for it is starting influences on minds as well as grounds, which will go on broadening and extending through all time.

The recent spring floods and summer droughts in Indiana, Ohio, and elsewhere, increasingly and now alarmingly destructive, are calling public attention to the cause and remedy as never before. The denudation of the hills and mountain sources of the springs is the leading cause of these freshets, and this can be remedied only by the extensive reforesting of such lands. This great result, which must be the work of time, will be best accomplished by interesting the young, as well as the old, in tree planting. The arbor day in schools will do immense good in this direction. We need to popularize and diffuse the sentiment of trees. This will best secure their propagation and protection.

The frequency of forest fires is the common objection to economic tree planting. But let the sentiment of trees be duly cultivated, and they will be regarded as our friends, as is the case in Germany. The public need to understand that the interests of all classes are concerned in the conservation of forests. In Germany, Switzerland, Sweden, and other

European countries this subject is so taught in their schools that the people generally appreciate the value of trees and the need of protecting them. Hence an enlightened public sentiment is a better guardian of their forests than the national police. A person wantonly setting fire to a forest would then be looked upon as an outlaw, like the miscreant who should poison a public drinking fountain.

The subject of forestry, old and familiar in Europe, is comparatively new in America. As yet we have no forest schools or colleges, like those so numerous and liberally supported in Europe. We have even a forestry department in only two American colleges. But in economic tree planting the last ten years have witnessed an advance in our country unequalled in any other within the same limits of time. Though as yet a mere beginning, compared with the promise of the near future, this grand movement is now starting in the West with such an impetus and already with such results as to insure its expansion over vast areas. The immense plains of the new West, which were "the great American desert" in the old geographies, are being rapidly made habitable and hospitable by cultivation and tree planting. Where, fifteen years ago, the books said trees would not grow, the settler who does not plan for tree planting is the exception. The leading western railways are greatly helping on this work. The Northern Pacific, for example, has set apart $80,000 for a forestry department and transports trees for planting free of charge to any settler on or near their lines. In Nebraska this work has extended for over 300 miles west of the Missouri River, and on the wide prairies of that State alone it is said that over 45,000,000 trees are now thriving, where a few years ago none could be seen.

RECESS.

ADDRESS OF HON. WILLIAM T. HARRIS, LL. D.

In this age of reforms one must not dismiss the subject of a proposed change without giving careful consideration to its claims. It is obvious, on the other hand, that one should not adopt such proposed change until after still more careful scrutiny of the grounds which led to the original adoption of the usage, for only by this can we discover how it is that those grounds are no longer valid against the removal of the usage whose right to exist is challenged.

Change is not reform unless it secures or assists in securing better results from the whole system.

It is easy to detect small evils and to suggest reforms of those evils provided one leaves out of view the demands of all the other phases of the system. But only those reforms deserve to be adopted which make the whole more efficient.

It is, I suppose, the object of this association of superintendents to discuss these proposed changes in the management of schools. A dis-

cussion of the question of the "recess" in school has been given its place on the present program with a view to develop at least some of the grounds for retaining or for abolishing that regulation.

The recess as it exists and has existed is the suspension or intermission in the work of the pupil, arranged to take place at or near the middle of the forenoon session of three hours and similarly in the afternoon session.

Within the school the pupil is supposed to be under a severe strain of discipline and attention to study, regularity, punctuality, silence, conformity to rules as to sitting or standing, strict self control on the part of the pupil, and a forced attention to his lesson, or to the recitation of his fellow pupils, or to the explanations of the teacher. All this produces a great tension of physical and mental powers. If it were continued too long, congestion would be produced, affecting the heart or brain or the digestive function or some local nerve centre. Past experience, noting this fact, has endeavored to avoid the danger by establishing the recess. The pupils are all dismissed from the school building and removed from the school restraints for an interval of a few minutes. The pupil leaves the close air of the school room and rushes out into the pure air, suddenly relieved from the cramp of muscles in sitting in a particular position on a hard seat, and relieved likewise from the cramp of nervous energy that has been diverted from natural functions of digestion, circulation, and secretion and concentrated on the conscious processes of attention and obedience to the external commands of the teacher or to his own self imposed industry.

The chief use of the recess is its complete suspension of the tension of the will power and the surrender to caprice for a brief interval. Any form of calisthenics or gymnastic exercise is therefore a diversion of the recess from its normal function. It is the substitution of one kind of tension of the will for another, as we shall attempt to show when we consider what the proposed reform will substitute for recess.

It is clear that the question of justifying the recess as it exists must be settled affirmatively by establishing the necessity for this relaxation of the mental and bodily tension of school as often as once in an hour or an hour and a half, or in the negative by the demonstration that a longer interval of tension will answer quite as well.

(*a*) If school were held in one session a day lasting from nine o'clock in the morning until four in the evening, without intermission of any kind, it is easy to see that there would be a flagrant abuse of the health and strength of the body. The advocates of change do not recommend that. (*b*) If the school were held in two sessions a day of an hour or an hour and a half each, it is equally clear to all that there would be no need of recess in either session of the school. (*c*) But for a session of three hours, or even two hours, most teachers now hold that there ought to be, for young children, a recess nearly in the middle of it. Besides this, the interval between the forenoon and afternoon sessions should be an

hour at least. The recess should be from ten to twenty minutes long. All concede that the age of the pupil is very important in determining this question: (1) For children of the Kindergarten, aged from three to five years, there must be not only a recess every hour, or at least every ninety minutes, but there must be willingness to permit the children to go out of the school room at other times. (2) Again, at the age of five or six years, the time of confinement to work should be brief, but there may and should be more strictness in controlling the caprice or casual necessity of the pupil. (3) For pupils in high schools or in the higher classes of the grammar schools there may be a two-hour session without recess.

Those who propose to abolish recess seem in their arguments to ignore the validity of the obvious physical reasons for its establishment and to advocate the change on the grounds of convenience and of moral results. It is argued that the recess is a serious drawback in the way of preserving the tone of discipline in the school room. It is also injurious to the morals of the pupils by reason of the fact that the pupil associates with his fellowpupils without restraint, and may or must see boys of worse character than himself, and learn much evil of them. There has been a feeling that association with others should be very select, and that "to turn out together into a school yard several hundred boys is morally dangerous."

Admitting some force in this moral argument against recess, we insist that the original reasons for its establishment were physical ones, and that the new plan proposed does not meet them. The physical reasons are imperative; the moral reasons are only comparative and not decisive. Abolish recess and let children attempt to sit for two or three hours under the constraint of the school room, and the physical system will suffer such injuries that lifelong inconvenience will result.

The tension of the will requisite to perform properly the requirements of school discipline and instruction is such as to withdraw the nervous energy from those great centres of secretion and circulation, the stomach, the heart, the kidneys, the liver, the lungs. Congestion, as before said, is easily initiated and if continued will produce functional derangements connected with the organs of digestion and circulation. The seeds of indigestion, renal weakness, liver complaint, constipation, even of fearful scourges like Bright's disease, may be sown in the system in early years by injudicious confinement in the school room.

We have been told, it is true, that practical experiment in the abolition of the recess establishes the fact that no inconvenience whatever follows from it. But how is this fact established? The injuries of overtension do not appear at once. The fearful weaknesses that result from neglecting the calls of nature are not perceived directly. Pupils will not confess, even to their parents, their own cases of suffering from enforced restraints and consequent inability to attend to these calls. Only in conversation with adults can one collect evidence of this sort.

Abolish recess, and within a few years the medical profession would trace to their source in the school room many disorders in the functions of the glandular system. In the reaction produced against this ill considered reform in recesses, it would be swept away in a hurricane of popular indignation.

But we are told that the physical requirements are well looked after in this proposed reform. The periodicity in the functions of the secretory glands is to be provided for by a general regulation allowing pupils to leave the room whenever they wish to. This the advocates of the abolition of recess concede to be necessary. Here comes the difficulty. In practice, the teacher finds more evil to result from this indiscriminate permission to go out during the school time than from all other sources combined. Every teacher of experience will support my testimony on this point with his own. It is a constant temptation to the frivolous pupil, and demoralizing to a high degree. He will find it convenient to leave the room whenever he wishes to avoid a recitation or any unpleasant duty. But we are told that this evil need not be tolerated — the children need not be allowed to go out indiscriminately. If, however, the teacher is to be constantly interrupted in the course of other work with the problem of deciding what cases are necessitous and what ones are not, then all other work will suffer and even yet many serious mistakes occur. The least impatience manifested by the teacher at the interruption occasioned by the pupil will have the effect of a general restriction. A petulant word in response to the child's request deters him from asking again on another occasion, and he prefers self denial. The restrictions placed on free going out, adopted to prevent the abuse of the privilege by the roguish or vicious, result in holding back the timid, modest, retiring pupils, who are eagerly intent on winning the teacher's good will. Such will suffer excruciating torment rather than draw attention to themselves by leaving the room or by asking permission to do so. Even a look of inquiry from the teacher is too much for such pupils to bear. Hence, not knowing the serious evils resulting, the most exemplary pupils will lay a foundation for the lifelong physical weaknesses already hinted at.

All this would result from changing a custom which long usage has sanctioned. By the recess as it exists necessities are provided for without questioning the pupil, without discriminating as to his wants. A general recess provides for all cases, and all will take advantage of it. Abolish general recess, and it must be compensated for by an indiscriminate permission to leave the school room at pleasure or else by a discrimination which is both indelicate and a sure cause of physiological evil. There is enough in this phase of the physiological question to condemn the new theory.

The next physical need is relaxation; the pupil needs to stretch his cramped muscles and send the blood in torrents through his limbs, which become torpid with unuse while he has been sitting or standing

for the school exercises. The pupil is in want of fresh air and of the deep inflation of the lungs that exercise in the open air gives. He ought to use his voice, too. The reformers propose to substitute calisthenics for the purpose of supplying all these wants. They will throw open the windows and let in fresh air; they will have a system of well devised movements which will give the needed circulation of the blood, &c.

Calisthenic exercise serves a good place in the school room, but its most important function is not a physiological one. It is true that the blood is caused to circulate more vigorously through the limbs and those parts of the body that have become partly torpid with sitting or standing still. But the chief demand upon the pupil in the calisthenic exercise is a requirement of him to strain his attention and exercise his will. It is a will training to a greater extent than a physiological training. The great distinction between work and play is this: in play, the mind is spontaneous, governed entirely by its own individuality; in work, the will power is exercised to conform its individuality to some externally prescribed course of action. Calisthenic exercise is severe work, and not by any means a relaxation. But the child needs relaxation, and not merely a change of work, although the change is of some benefit. The exercise of the limbs in accordance with a prescribed formula is not the thing that nature requires.

What has the child been doing? Consider it again. He has been exercising his will in the four directions of self control: to be regular, punctual, silent, and industrious; now giving his attention to the mastery of some subject by himself and anon following with alertness and critical acumen the recitation of some fellowpupil or some explanation or direction by the teacher. Calisthenics does not afford relief to the will power. We have seen that all exercise of the will in the act of fixed and unremitting attention has a powerful influence over the digestive, circulatory, and secretory functions of the body. This influence, if not intermitted, will cause derangement of each and all these. A run in the open air, a saunter at will, or a vigorous game with one's fellows, free from restraint of authority, any exercise, in short, of the spontaneous choice of the pupil, will give this desirable relief to the heart, the stomach, the glands, and ganglia. Once in two hours for older persons, and once in an hour or an hour and a half for children from three to twelve years, is not too often. The recess covers the physiological demands as no other device has done or can do.

The moral argument in favor of the abolishment of the recess does not bear careful investigation well enough to justify so serious a violation of the principles of physical education.

In the first place, it is obvious that the recess does not furnish an opportunity to form acquaintances to such an extent as the association in coming and going to and from school, morning, noon, or night. In those cases where the noon hour is passed by the pupil at school he is

thrown together with others, with leisure on his hands for forming friendships. In the recess everything is comparatively hurry and confusion and there is very little opportunity for the growth of intimacy. It must be kept in mind that it is close attachments, and not mere passing acquaintances, that do injury to the morals; that the cases in which bad boys of strong individuality attract weaker companions are the dangerous cases. The recess is not the place where this species of mischief is accomplished to any great degree. In the recess the pupil is in presence of the whole school, and each individual is giving vent to his pent-up inclinations and impulses, and there is a sort of protection from the danger of one individual in the sheer multitude of individuals which surround him.

If there is anything in the moral argument against recess, it holds with stronger force against association at noon and in coming and going to and from school. But, it may be inquired, ought this limited association to be prevented? Is not the school valuable in this very feature, that it brings together young people under such limitations and restraints as to permit and encourage reaction against evil influences?

The flowerpot theory of nurture has not received its justification at the hands of the history of education. The laissez faire system may be conceded to be worse, but that does not warrant us in adopting the discarded educational device of seclusion and non-social nurture. The cloister would do if there were no other human institutions that had a divine mission. In the history of the christian church there was an evolution through the stages of the anchoritic to the monastic modes of holy living; then came a great reform through the Dominicans and Franciscans in the thirteenth century, and seclusion came to be regarded as less holy than labor with and for one's fellowmen. Mere personal salvation by means of isolation from human life and its temptations was found to generate the mortal sins of slothfulness, gluttony, and their train, while the celestial virtues of hope and charity were dwarfed for want of occasion for exercise.

Man's life is worth living when he builds institutions; only in the institutional life does he achieve a holy life. The family, civil society, the state, the church—these form the ascending series of cardinal institutions, the church being the one which continues through into all future life. According to the flowerpot theory of education, the individual shall not learn to know himself through seeing himself magnified and reflected in detail by his fellows, so that he shall come to sure self knowledge; nor shall he learn to preserve his individuality from the whirling vortex of another's individuality. Hence he shall be doubly weak: weak in his ability to resist evil and weak in his ability to discriminate the influence and drawings of the good from the evil and from the influence of the evil and wicked.

One of the chief means of protection from personal influence and its

false attractions is the very multitude of individuals in one's circle of acquaintance. One condemns in another what one permits to himself; hence arises a public opinion wherein each one helps all and all help each. Vice is special, while virtue possesses generality and universality in its very constitution. Hence it happens that society is moral in its general or pervading influence. A series of individuals do not possess all the same vice, and they do not approve the vice of each other where it produces inconvenience to themselves. It is of the nature of vice to arise from selfishness, selfishness being the root of sin and immorality. Selfishness is antisocial in its very nature. Therefore, in the long run, every form of immorality meets opposition from one's fellowmen. The fact that this social disapprobation is not direct and immediate is the reason why there are dangers in contact with the world as well as direct benefits from it.

It is therefore not possible to avoid dangers in the education of youth by seclusion. But the true course is to watch and help the child against too strong attractions which he encounters. The school helps this counteracting influence powerfully. In the school room there is exhibited daily a trial of strength and skill in overcoming obstacles to the knowledge of truth. Each pupil struggles himself and beholds the struggles of his fellows. The spectacle of this struggle for the mastery of knowledge and power of comprehension is a highly moral influence on the pupil. Self control is the basis, obedience to right authority is the means. The cardinal virtues of the school room are regularity, punctuality, silence, and industry. These school room virtues reënforce all other virtues.

To educate a youth so that he shall have a strong moral character, do not isolate him, but teach him to come out unscathed from temptation. The school, like all opportunties of life, is a place abounding in temptations, but it has unusual safeguards against corruption. The watchful eye of the teacher is likely to discover tendencies before they have ripened into vices. The teacher guards first, the parent guards secondly, the whole family influence is exerted in behalf of the individual, and the power of the church supports the good influences.

To preserve one's self good and pure amidst evil surroundings is to attain a moral character; to be preserved from evil character by seclusion is to remain innocent, it is true, but is not at all to gain a moral character.

To sum up our reflections, then, the recess has been established by the practical wisdom of the past school management, and it seems to meet certain physiological requirements of the young and growing individuals for whom it is appointed in a better manner than any other device yet proposed can do.

The moral argument used against recess applies against association in coming to school and in returning from it, as well as in remaining

at the noon intermission, but is not of force against recess, because this is the only interval where the pupil is out of school and yet completely under the control of the teacher.

The fact that quarrels occur at recess proves its importance. There is no greater lesson to learn than the lesson of peaceable combination with one's fellows: how to get along with them without quarrelling. In the well supervised recess the boy learns not to be a prig, who turns up his nose at his fellows and says "I am better than you."

The teacher has no other opportunity so good as the recess wherein to teach the pupils to treat one another politely by repressing the rudeness, personal violence, profanity, and obscenity that will break out but must be suppressed and eradicated. Before school, after school, and at the noon intermission the province of the teacher's authority overlaps that of the parent, and the power of the teacher is lamed.

But, even were the influence of the recess an immoral and dangerous one, still there would be no choice in the matter, for the physiological reasons for its existence are imperative and final.

NO RECESS.

ADDRESS OF HON. S. A. ELLIS.

The recess has been characterized as a "time-honored" institution, for, until recently, it has been regarded as a necessary accompaniment of all school keeping. It follows naturally therefore that, in whatever place the proposal is made to abolish it, a prompt No! is the immediate answer. So said the superintendent of schools and the board of education of the city of Rochester, N. Y.; and yet a careful examination of the question led to the adoption of the no recess plan by a unanimous vote of the board more than a year since, and it is in successful operation to-day.

So far as I have been able to learn, one of the first attempts to do away with the recess in the public schools of the Empire State was made in the city of Oswego, at the instance of Superintendent Robb, now of Cohoes, N. Y. The success claimed for the measure after time enough had elapsed to determine some important questions in regard to its practical working, led to its adoption in Cohoes, Albany, Troy, Rochester, Waterloo, and Port Chester, N. Y. In the schools of Newport, R. I., Woburn, Mass., New Brunswick, N. J., Bay City, Mich., and in many other places, the plan is in successful operation.

In several cities in New England the afternoon recess has been abolished for some time. In other cities and towns of the country the question of no recess is under serious consideration, with a strong tendency toward the discontinuance of the recess and the consequent shortening of the school hours.

Having put myself on record as favoring this plan, I have been honored with an invitation to present to you some of the arguments in its favor.

Before, however, proceeding to the argument, let me give an outline

of our plan in Rochester, which differs but little in detail from that adopted in other cities where the general recess has been abandoned.

The regulation requires that the morning session shall begin at 9 o'clock and close at 11.30 A. M. and that the afternoon session shall begin at 1.30 and close at 3 o'clock for the seventh, eighth, and ninth grades — the lowest — and at 3.30 for the intermediate and grammar schools. At 10.30 A. M. and at 2.30 P. M. it requires that the windows and doors of all school rooms shall be opened, while the pupils are exercised for five minutes in light gymnastics and marching, full liberty to be given to pupils to leave the room whenever they ask the privilege.

By this arrangement of school hours, the daily session is shortened one hour.

In the arguments I shall offer in favor of abolishing the general recess in the schools of our cities and larger villages where tolerable ventilation can be secured, I shall doubtless afford another illustration of the saying of Solomon: "The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun;" for the recent discussion of this subject in Boston, Springfield, and elsewhere has probably brought to light nearly all the reasons that could be adduced pro and con. Still, let me hope that from my own experience and observation I may bring some small contribution to a more intelligent understanding of so important a question as all concede this to be.

The general recess should be abandoned:

First. Because it is and always has been, in cold and stormy weather, a fruitful source of colds, with their attendant disorders, such as catarrh, sore throat, diphtheria, pneumonia, &c. In the excitement of going out many of the pupils rush from the warm air of the school room, heated to a temperature of from 70° to 75°, into the open air with a temperature ranging from 30° down to zero, the boys without overcoats, overshoes, and often without hats, and the girls without bonnets, shawls, overshoes, or other outer protection. Some play in the storm or wade and tumble in the snow until feet and clothing are thoroughly wet, while others work themselves into a state of intense perspiration by the violence of their exercise. In this condition they return and sit down in the school room, the temperature of which, during the recess, has been reduced to 45° or 50° in the process of changing the air. Through such exposures as these we should naturally expect to see many even of the hardier and stronger pupils fall a prey to the diseases we have mentioned, as, upon inquiry, we shall find they do. If the more healthy and vigorous fall out by the way, the results prove even more disastrous in the case of those who are shielded from exposure and tenderly cared for at home.

"The wonder is," says Superintendent Robb, "that all, both strong and weak, are not made speedily ill with attacks of colds, sore throat, and pneumonia."

If we were able just here to "strike the balance" between the physical advantages and disadvantages of the recess, I am confident the latter would far outweigh the former.

Before leaving the discussion of this point in the argument it would be pertinent to inquire what are the physical advantages of the recess to those who do not, as a rule, take advantage of it. In every large school there will always be found a considerable number of the older pupils—of the girls especially—who seldom leave the school room except at the close of each session, and whom, as one of our principals said, he could not have the heart to drive out into the cold. Others there are who remain in at recess in compliance with the expressed wish of their parents.

Second. Because the recess furnishes the occasion for many severe physical injuries. The records of any large school will not fail to furnish one or more such cases. I seldom witness the rush of three or four hundred school children, of all ages and sizes, from the school-house on to the playground without having my fears excited that some of the little ones may be maimed for life or killed outright. That many are battered and bruised and made utterly miserable by being jerked and hauled about, in the excitement and violence incident to rough play, by those who are older and stronger, there can be no question. And I do not see how any supervision by the teacher, such as is possible in the ordinary public school, can afford a remedy for this evil without putting such a check upon the various kinds of sport indulged in as would deprive the recess of the chief advantage claimed for it. It might, however, I will admit, furnish an opportunity to test Darwin's theory of the "survival of the fittest." Ask the principal of any one of our city schools, and he will tell you that there are few recesses that do not furnish from one to half a dozen complaints from pupils who have suffered violence at the hands of their more able-bodied companions.

It often happens, therefore, that those who stand in greatest need of the exercise in the open air that the recess is supposed to furnish—the weak lunged and slender limbed—are forced to stand around in the lower halls, on the steps, or on the outer edges of the playground, for fear of being "run down" or "pulled apart."

Third. Because a large proportion of the cases of discipline in any school have their origin on the playground at recess. The quarrels and personal encounters growing out of the "rough and tumble" plays at a general recess, requiring the time and attention of the principal to settle, are numerous and aggravating. Boys who, under ordinary circumstances, are good tempered and civil are, in the fierce excitement of play and while the blood is hot from violent exercise, frequently stung into sudden retaliation and return "blow for blow." Superintendent Cole says that one-half the cases of discipline in the Albany public schools arose from collisions on the playground at recess. Similar testimony comes from other quarters.

Fourth. Because it affords an opportunity for the tyrannizing of the older and stronger over the younger and weaker pupils. The average boy has in him some of the remnants of the savage, and one of our playgrounds at recess furnishes an excellent opportunity for the full exercise of this savage instinct.

Was there ever a school playground that did not have its bully who delighted in terrorizing the weak and timid? No wonder the parents of shy and sensitive boys and girls prefer that they should remain in at recess rather than allow them to brave the terrors of the playground, ruled over by its mimic Nero. Oh, the miseries of childhood, suffered on the school playground! who shall recount them? Recalling his own school days, Anthony Trollope says: "The indignities I suffered can never be described," and Lord Lytton, when a boy, was made so utterly miserable by the treatment he received at his first school that his mother took him home at the end of two weeks.

And what is the advantage of all this? Under such conditions, does not the "bully" become more and more of a "bully" and are not the germs of courage and self reliance in many a timid soul choked even before they are allowed to assert themselves?

Surely it cannot be necessary that even the few should suffer, in order that the many should have a "good time."

Fifth. Because it offers unusual opportunities for moral contamination. When four or five hundred boys and girls from all classes and conditions in life—some from homes of drunkenness, misery, abject poverty, and squalor, where profanity and vile epithets form the staple of conversation, and some who, although surrounded by healthier influences, seem by instinct to revel in impurity—are let loose upon the playground, we should naturally expect that words would be spoken and improprieties committed which no supervision possible could prevent and which would probably not have found outward expression under other circumstances. An abundance of direct testimony on this point is not wanting. We have but to interview any principal or teacher of long experience, and we shall find but one opinion touching this evil. Let one of many speak. Superintendent Robb, of Cohoes, whose long experience as a teacher and supervisor entitles him to speak ex cathedra on this subject, says:

The miserable inadequacy of the provisions made in the best arranged of our school buildings for water closets, &c., make them in the case of a general recess the necessary scenes of vulgar exposure of person. To this is to be added the fact that in every group of five or more children of either sex there will be found at least one, often more, whose mind is grovelling, and who is incapable of distinguishing between wit and vulgarity, and who finds, in the presence of his companions, a strong temptation to exhibit what he deems smartness by the use of vulgar obscenity; and I am sorry to be obliged to say that in my experience with school children I have found but little difference in the sexes in this respect, except that the girls are more secret, and therefore more insidious, about it.

It is doubtless impossible for us to keep our children altogether free from contact with the vile in speech and the impure in thought and life, since these are not wholly confined to any one class or condition; but we shall fail of our duty if we do not, so far as lies within our power, lessen these opportunities for moral contamination. That they must meet and overcome the temptations to evil that lie in their way, in order that they may become morally strong, is true; but surely they will meet enough of these elsewhere to harden their moral fibre without exposing them needlessly to the temptations and evil influences incident to the general recess. So long, therefore, as the general recess is maintained, we may give our lessons on "morals and manners" and look to see them made of "none effect," to a large extent, by the profane and the impure, who will seize upon so favorable an opportunity as is thus offered to prove that the doctrine of "total depravity" is not a mere "figment of the imagination."

This evil is by no means confined to the playground of the public school, but will be found to exist, to a greater or less extent, on the playground of any large school, whether private or parochial, where large numbers of children are assembled and the ordinary restraints are withdrawn.

Sixth. Because of the inadequacy of the playgrounds connected with many of our school buildings. If the recess is to be of any practical value, it will be conceded that an ample playground is a necessity. How many of the school buildings in our cities and larger villages are provided with such? I can answer for the city of Rochester. Out of twenty-seven buildings there are but seven that have suitable playgrounds, while there are ten that have no playgrounds at all. Two others adjoin public parks which are used as playgrounds. It will thus be seen that a large majority of our school children, if they play at all, must play in the streets and run the risk to "life and limb."

That there will be any improvement in this direction in the future there is no reason to hope; for the increase in the value of land in all our cities and the tendency to a more rigid economy in the management of the public schools will be likely to give us lots just large enough for the building to stand upon.

Seventh. Because in our cities and large manufacturing towns the attendance of pupils is seriously interfered with by the necessity that requires the boy or girl in the family to carry dinner to father or brother in the factory or workshop. This brigade of dinner carriers, augmented by the paper carriers and errand boys, is the bane of many a school, as it not only brings down the attendance, but seriously interrupts the work of the pupils.

As under the no recess plan the morning session closes at 11.30 o'clock and the afternoon session begins at 1.30, the two hours of intermission furnish ample time for the dinner carriers to discharge their important function without interfering with school work or attendance;

while the afternoon session, closing at 3.30, gives time for the paper carriers and runners on errands.

Eighth. Myopia among school children, it is said, is alarmingly on the increase in this country. Recent examinations of the eyes of school children in the public schools of several cities—Rochester among the number—go to show, say the physicians, that this disease to-day is nearly as prevalent in this country as in Germany, which outranks every other country in the world in the number of her nearsighted. As myopia seldom appears before the fifth year, nor after the twentieth, the mischief is done during school life.

Among the causes contributing to it in the public schools, it is alleged, is imperfect light.

Notwithstanding the great improvement in the construction of school buildings during the past few years, the well lighted school room is very far from being the rule. In all but the best lighted rooms it is difficult for even the strongest eyes to see clearly the printed page after 4 o'clock in winter. By closing the afternoon session at 3.30 the work of the school is done by clear daylight, even in the shortest days of winter, thus removing the serious danger of damage to the eyesight that must follow upon reading and study in a dark or dimly lighted school room.

Ninth. The long intermission at noon, besides serving family convenience, furnishes a good respite from all mental work and an opportunity for both teacher and pupil to eat their dinner without haste and to rest a little after the meal. That these conditions are favorable to both physical and mental vigor will be readily conceded.

Tenth. The no recess plan, while it denies opportunity for play and exercise on the school playground, actually increases the amount of time for recreation to be enjoyed by every pupil, and, ordinarily, under wiser and healthier conditions. To the fifteen minutes devoted to recess in the morning and afternoon is added another fifteen minutes in each session, as time lost in the preparations for the recess and in recovering from its effects, and the daily session has been shortened, as will be seen by our program, one full hour. This time the pupils are at liberty to use as they or their parents may determine.

Eleventh. The general recess should be abandoned because it is generally, if not always, a disturbing element in the real work of the school. Habits of study and of fixed attention, that are so essential in all successful school work, are difficult of attainment where the sessions are broken in upon and interrupted by the recess. Says Superintendent Robb:

> Many times the more feeble or nervous of the pupils will return so completely exhausted as to be entirely unfitted for mental labor for the remainder of the session; or, as is frequently the case, they will have been made the victims of rough treatment by their stronger and hardier companions, who return to their seats out of breath, full of excitement, and with their minds filled with the doings of the playground.

And now, as a practical answer to most of the objections urged against the no recess plan, let me rehearse briefly the results of this experiment in the Rochester schools:

(1) The plan has the indorsement of a large majority of our physicians who have examined the question and the hearty approval of patrons, pupils, and teachers; also, of the city "press" and of intelligent citizens generally. It has, in fact, been a matter of surprise that a change so radical, and one touching so many of our people, has awakened no opposition up to this time worthy of the name. On the contrary, the board of education and the superintendent have been frequently commended for taking the step. Moreover, to my personal knowledge, a number of parents who would not, for sanitary and moral reasons, send their children to the public schools while the recess was in force, have been among our patrons ever since the change was made.

(2) The evidences submitted go to show that the continuous session promotes, rather than interferes with, the health of the pupils. There have been fewer pupils suffering from headache, colds, sore throat, &c., than formerly, while there has been no perceptible increase in the amount of listlessness, inattention, and languor observable in the pupils.

(3) The number of cases of discipline has been considerably diminished and the general deportment has improved. Good order is promoted and the general discipline of our schools greatly simplified. Touching this point, Superintendent Cole, of Albany, says: "Cases of corporal punishment in our schools have decreased 25 per cent. since the recess was discontinued."

(4) There has been a marked improvement, both in punctuality and in regularity of attendance. The dinner carriers and errand boys find time enough out of school hours for the discharge of their duties.

(5) The two continuous sessions, broken only by the calisthenic exercises of five minutes in each, tend to promote habits of study and of fixed attention. The effect on study and recitation, according to the testimony of our teachers, has been decidedly wholesome. Better work is done in the four and a half hours than was formerly done in five and a half.

(6) The interruption caused by pupils leaving the room proves to be no greater than when the recess was in force, and, in some instances, teachers report an actual decrease in the number who ask to leave the room.

(7) Touching the question of physical recreation, there is just as much evidence to show that it is promoted as there is to show that it is interfered with by substituting no recess for the recess, and it is mere presumption to assume, as has been done by writers on this subject, that exclusiveness is substituted for that free intercourse of children on the playground that destroys class distinctions or that the children are kept away from air and sunlight; for, as the pupils have a full half hour more than before out of school, they may be safely trusted

to find playfellows enough, and not from their own particular class either, and to make good use of their time in recreation and play in sunlight and air.

In his annual report of the public schools of Newport, R. I., for 1883, Superintendent Littlefield says:

If it is feared that the abolishment of recess, with the consequent exclusiveness which may be enjoyed by the pupils, is a step in violation of the democratic spirit of American institutions, it may be said in reply that school children are too young to be intrusted with the responsibility, which a youth might assume, of sharpening themselves morally by contact with a promiscous company of their own age. The yard of a great city school at recess, too, often presents more different types of character—moral, intellectual, physical, and national—than can be found in any other of our mixed assemblies. No ward room at its greatest density contains so many kinds of people, nor those so susceptible to influence. The strain of a great recess, therefore, is often disastrous to young children, and it is that fact which has served as a chief influence in recruiting private schools. Let the public schools content themselves with affording large opportunities for mental attrition, under the guidance of active, scholarly, impartial teachers, together with the high moral influence that every teacher should exert, and let the home neighborhood for the present furnish what other discipline may be needed to fit children for the duties of good, independent citizenship.

As numerous inquiries have been made concerning the opinion of our city physicians of the no recess plan, it is to be presumed that the hygienic aspect of the question is deemed highly important. Since this point will be conceded and, if possible, emphasized by the advocates of no recess, the recent action of the Pathological Society of Rochester affords a very valuable—perhaps I should say an invaluable—contribution to this subject.

Some months since this society, that numbers among its members some of the ablest physicians in the State—one of whom is a conspicuous member of the State board of health—took a ballot on the question of recess or no recess, *without discussion*, eighteen members being present. Nearly all voted in favor of the recess, a result that might have been expected under the circumstances. A few weeks since, at the request of one of the members who had dissented from the opinion expressed at the previous meeting, the question was again taken up and discussed. By request, I submitted a statement of our plan, together with the reasons that led to its adoption. At the close of the discussion, another ballot was taken with the following result, twenty physicians being present: fifteen voted in favor of no recess, three voted for recess in summer and none in winter, leaving only two who voted for the general recess. Before the vote was taken, one of the physicians requested that, if any member of the society had met with a case in his practice where he had reason to believe that his patient had suffered from the practice of no recess in our schools, he would make it known. No instances were mentioned.

Finally, in response to a circular sent to a number of superintendents

of cities where the no recess plan is practised, the following replies were received:

To the question "Has the plan proved successful?" Albany says, "A complete success;" New Brunswick, N. J., says, "To all appearances a perfect success;" Cohoes, N. Y., says, "Eminently successful;" Newport, R. I., says, "The plan has proved successful;" Bay City, Mich., says, "The plan is successful;" Woburn, Mass., says, "Entirely successful."

To the question "Is it regarded with favor by your citizens generally?" Troy says, "I have never heard more than one complaint about it;" Cohoes says, "Yes! and, indeed, I know of no person who would be in favor of a return to the recess plan;" Albany says, "Yes! the longer it is tried the warmer is the approval of our citizens;" Newport, R. I., says, "It has been frequently pronounced to be the best arrangement of school hours we have ever had."

Prof. A. W. Drummond, of Port Chester, N. Y., says: "We have had no recess for many terms, and like the plan much." And so from all quarters where the plan has been tried comes the same testimony in its favor. In answer, therefore, to sentimental conservatism and plausible theoretical arguments, we point to practical results. Wherever this experiment has been tried, physicians, parents, teachers, and scholars say, "No recess."

Mr. GOVE, in the discussion following, which was limited to five minutes for each speaker, said that he had no sympathy with the sentiments of the paper just read. His personal knowledge of the subject extended no further back than 1863, when the superintendent of the schools of Peru, Ill., W. B. Powell, abolished recess. He had experienced the fever himself some fifteen or twenty years ago, but had recovered. The evidences in favor of "no recess" are worth but little as yet. The few years that the experiment has been tried are not sufficient upon which to base a correct judgment of the results. Of course the teachers are satisfied; it would be strange if they were not. The pupils are said to be pleased; that is a very poor administration that could not make the pupils satisfied with any scheme which had the hearty coöperation of the authorities.

The one purpose of the school work is to make men of the boys and women of the girls. The experiences that will develop manhood are found on the playground. The bully of the playground! Of course there is a bully on the playground; but what is the playground but an epitome of the world? It is stated that so far there is a falling off of the cases of discipline. Yet is it not possible to have such a falling off and still that be a not healthful sign? It is said that recess hinders the progress of the school. That depends very much on what is meant by progress. It does hinder progress if it means that the children are to sit and perform mental tasks from 9 o'clock in the morning till 3 or 4 in the afternoon. The rush to the playground is believed to

endanger the lives of the children. That is not necessary. The exceptional cases where it takes ten minutes to empty the school-house are not to be considered, but the usual case where it takes two or three minutes.

Mr. BUEHRLE thought that the statement of the good results flowing from the abolition of recess should be carefully weighed. It seemed to him that, as yet, there were not sufficient data upon which to base a conclusion. Reports of a few years' trial of a system recommended by those in charge of the schools will hardly be likely to give reliable information in regard to a subject of so much importance. Now, if a statistical statement could be obtained from the different cities in this country, extending over several years, of the number of pupils who do not avail themselves of recess, who remain in the school room by request of their parents or for other reasons, and if their health, their morals, their habits of study could be compared with others in the same room who do avail themselves of recess, then at least a partial basis, from which conclusions could be drawn, would be given. The statement that a town has found the system to work well for two or three years must be taken with considerable allowance. It is well that attention has been called to the necessity of playground experience. Suppose it is true that a great part of the time of the school is taken up in investigating and settling difficulties and differences that have taken place upon the playground, is not that a very good school for any child to go through? Is not that pretty good preparation for the difficulties and trials that meet one in life, and does not that afford to the teacher the best possible object lesson of the utility of government and of the necessity of law and order? What better field for illustration could a teacher on the subject of government want than just those very events that happen from day to day on the playground?

Mr. SANFORD thought that the noon recesses especially were to be condemned, owing to the moral contamination resulting from the gathering together of the children at that time.

Mr. RICHARDS said: As we were listening to the able paper of Dr. Harris, I have no doubt the most of us thought he had exhausted the subject of the recess question; but when Professor Ellis followed with the very clear and interesting statement of his views and facts in opposition to recesses, some of us began to feel, probably, that the arguments were on the other side of the question. Now these arguments, pro and con, have thrown us into a kind of dilemma. How are we to be extricated? I am inclined to believe that there is an easy way to get out of this apparently irreconcilable difficulty.

Let us accept the views of both gentlemen, for both seek to obtain the same end and to avoid the same difficulties. Their methods may differ in their details, but their main arguments are correct. The question is, How shall the physical energies of our youth be cultivated and utilized? There are many nervous, excitable youth, whose animal spirits

are running over with a desire for exercise. These energies must be utilized, and not wasted. Both the methods advocated seem to aim for this end. How can this be done and at the same time secure all the advantages of the recess and non-recess plans?

I think I can tell you just what kind of an arrangement we need. We need the industrial training of every boy and girl, under the guiding hand of a properly and specially qualified teacher: not for the purpose of training them for specific trades, but for the purpose of utilizing their superabundant physical energies and of developing harmoniously all the physical, intellectual, and moral faculties of their natures.

Let the school arrangements, for instance, be such that the boys and girls may pass into a properly arranged industrial room, where, under the direction of an experienced and specially trained teacher, they may have a chance to exercise their strength, ingenuity, and tastes in all sorts of hand work, so as to learn the elementary principles and language of the common employments of life. Let these exercises alternate with those of the intellectual school room during regular school hours. Organized sports and plays may also be introduced, under intelligent direction, so as to develop muscle and afford pleasing and healthful amusement, which will take the place of "rough and tumble" sport and aimless physical exercises.

If thought desirable, girls and boys can safely and properly engage in the same exercises. Girls will, however, need some exercises specially adapted to the employments of females. This can be easily arranged.

In the intellectual room there may be an exercise for forty minutes, where the attention must be fixed intensely upon subjects of thought; then have a recess by alternating to the industrial training room, to relieve the mind for a time by hand work, for 20 or 30 minutes at a time, thus alternating until the whole time of the school is used up.

Mr. HOUCK moved that the discussion be closed. Carried.

A recess of five minutes was then taken, and at its conclusion the members of the Department listened to the following address by Dr. E. E. HIGBEE, State superintendent of public instruction, Pennsylvania:

HOW A STATE SUPERINTENDENT CAN BEST ADVANCE POPULAR EDUCATION.

Yielding to the courteous compulsion of your president, I consented to prepare a paper on the subject already announced, although I should have been better satisfied had he allowed me the pleasure of listening to some one among you who, from longer service, has gained more experience and would be therefore far better qualified to guide this discussion than I possibly can be.

Again, inasmuch as the work of a State superintendent is, in very many ways, conditioned by the authority lodged in his hands—and this is different in different States—I have felt compelled to confine my re-

marks to what may be called the most general duties growing out of the office as such, irrespective of local limitations—duties which no doubt all superintendents alike must feel themselves challenged to fulfil in their efforts to advance "popular education."

PUBLIC SENTIMENT.

Umbilden—Einbilden—Fortbilden.

With us the whole system of popular education is organized by law, and not left to the voluntary impulses of the various communities which make up the State. It must not be supposed, however, that such impulses are to be set aside or neglected. The "thou shalt" of the law is without doubt categorically imperative, yet it is addressed to a will that is essentially autonomic, and hence if it is to be something more than a mere abstraction it must be met by the spontaneity of a free subject, which forms indeed the very element in which it is to make itself felt as something quite distinct from mere outward blind force. Law itself can never be properly effective unless the individual will is ethically mediated to it as the expression of the general or universal will. Without this the law will show itself arbitrary and tyrannical, and obedience to its demands be only slavery. Public sentiment, therefore—the individual thinking and willing of men in their social life—must be a matter of great concern to a State superintendent. By virtue of his office, he should pay special attention to this, guarding and guiding it in his sphere as best he can and with ever watchful care.

In various sections he may find an awakened interest, indeed, but an interest which fails to grasp the true purpose of popular education, serving to demoralize in place of advancing the whole work. The immediate needs of our natural existence assert themselves so strongly as to lead many men to make strenuous efforts to direct the work of popular education to merely local interests, binding it to those special trades or industries which the neighborhood has come to regard as of highest practical moment. This interest, narrow and one-sided, however popular it may be, he must strive to reform and transform (umbilden, as the German has it). There can be no permanent or solid advance in popular culture while an interest of this kind is made to rule. What is needed, in our judgment, is that parents and municipalities may come to see with some measure of clearness that the education of the young means vastly more than an apprenticeship to specific trades or industries, which, after all, are but instruments of life; that the as yet unformed character of the child demands a culture which shall give him the power of self possession—self willing and self thinking—enabling him to choose with intelligent freedom his calling and enter upon the personal work of determining his own destiny.

A State superintendent can advance the work just specified by coming into direct communication with the popular life, to transform such

one-sided and narrow interest as he may find prevailing. This he can do through the various opportunities which may come to him or be made by him. In teachers' associations, in county institutes, in public addresses before gatherings of school directors, or at the dedication of school-houses, and through the public press, he can accomplish this, or aim, at least, to give a proper tone and tendency to public thought, that there may be no opposition to a training of the young which is liberal and which can give them power to transcend their immediate environment of sense and sensuous appetites, and come into communion with the soul life of humanity in forms of reason and will, and find their own being joined in a common rational life with the thought and life of mankind.

Time does not allow us to follow out at greater length this important work of transforming a wrongly directed interest in popular education.

Again, the superintendent may find in certain sections an almost absolute indifference. Parents, impelled by natural instincts, will feed and clothe their helpless offspring, but then, with a strange selfishness, use their physical growth and strength as so much added family capital in the way of material pursuits. They fail to see that this is but little removed from merely animal life. The school must be neglected for the plough. The hours that should be given to study must be spent in the mine or the factory. The spiritual life must be merged in mere carnalities, and the child made almost a beast or a thing. This interest, or rather want of proper interest, needs to be informed with moral content (einbilden), that the children, as parts of the social organism, may have their rights assured to them, that they may have free room and all proper aid for their own personal development. Parents owe this to their children and the State owes this to its citizens. It is thought by many that a compulsory law here is what is demanded. Such law, it is true, may remedy, in an external way, much of the evil of such indifference. But there is no compulsion so mighty as an intelligent love, a moral sense of obligation interfusing the natural and instinctive impulses of parental life and leading to a reverent regard for the personal development and perfection of the children. It is the duty, therefore, of a State superintendent to use every effort to arouse a proper moral sentiment of this kind throughout such communities, to deanimalize them, so to speak, and awaken that inner compulsion of intelligent love which will lead parents eagerly to seize all the educational means which are so universally at hand.

Again, the superintendent may find, as I am glad to say he will throughout many of our States, a warm and sympathizing public sentiment already at hand. This he must intensify and advance (fortbilden).

Educational interests, as we all know, are so far removed from the ordinary material pursuits of life and are carried forward with so little ostentation in the quiet retreats of the school-houses dotting the hillsides and valleys of our land, that they demand a continuous stimulus.

The children are in most cases too young either to feel or to know their needs in this direction. Much less can they make these known to others in the way of challenging their attention. Hence, without keeping the public sentiment alive in their regard through journals and conventions, such as this and others of like character, throughout our various States, educational interest will be in danger of falling into the background or of being overwhelmed by the flood of material pursuits which is sweeping over the present age.

Thus much, brief and imperfect, relative to public sentiment.

LEGISLATION.

I now call your attention to legislation as related to public sentiment. While, as has been intimated, legislation must pay proper regard to public sentiment, so as not to be arbitrary and ineffectual, yet this public sentiment must be only the condition, not the ground of the law. What popular education intrinsically demands, what its true idea theoretically involves, the true purpose or end which it has in view, this must be the ground motive governing all legislation in reference to it.

I can refer to one point only pertaining to legislation, which, however, I regard as of very special importance at the present in the way of advancing popular education. It is this, viz, that the estate of education, the Lehrstand, is fully coördinate, to say the least, with any other estate of the Government, and should be so recognized, not only by the several States, but by the General Government itself.

Why, on any rational grounds, should the element of national defence, the Wehrstand, involving in this country the Regular Army and Navy and the organized militia, require more careful supervision and general management than the Lehrstand, involving the vast organization of the schools, the inner spiritual defence of the Republic, and reaching up into all the learned professions and technical institutes and art associations which characterize our modern civilization?

We are glad to say that in the Commonwealth of Pennsylvania—thanks to the prudent and effective work of the noble men who, following, at too late a period, however, the example of Penn himself, organized this work—the office of superintendent of public instruction is a distinctive part of the government itself, coördinate with the other departments of State administration. So should it be, not only in regard to the special administration of individual States, but also with the General Government itself, opening the way for a more organic unification of this work throughout the Great Republic.

Indeed, the work of popular education is becoming so massive and interstatelike and demands upon it are becoming so broad and national—especially when the large body of emancipated negroes are seeking as their right facilities for an emancipation more inward and spiritual than that already secured through the clash of arms and awful carnage of the battlefield, and when also the large mass of uncivilized

Indians, now almost a nomadic horde without any mind culture except that which may be gained in war and hunting, are asking in behalf of their children means of advance and culture which may make, at least, the coming twilight of their vanishing race bright with some rays from christian civilization—the work of popular education, we repeat, is becoming so massive and interstatelike and so many demands are challenging it that the time is already at hand when the General Government ought to see the necessity of going beyond the organization of a merely subordinate bureau commission, to secure for it a proper oversight and management.

Of course, in this country more than in any other, a vast amount of administrative work is done by voluntary associations; and it is well that it is so. But there is always danger that in work of this kind divergent policies may so fasten themselves in the public mind as in the end to arouse irreconcilable differences which disharmonize and retard and cripple the general work in hand. This has been felt already in the relation between our elementary training and our higher academies, and colleges, and universities. It is, in my judgment, very important, therefore, that in our newly erected States there should be such legislation in regard to public instruction as shall unify at the very start the whole movement, and thus avoid the very antagonisms and difficulties which have been felt in our older States, growing out of the relation, or rather want of relation, between the legally organized education and that which is carried forward mainly by voluntary associations not under the regulation of State laws. Hence, for our newer States and for our Territories, rapidly developing in resources and population and already standing on the verge of fully organized States, and for the large mass of uncivilized Indians and the larger mass of illiterate negroes in the South, a general supervision and management is demanded; and there should be at hand a general officer, or minister of education, whose reports should come before the Congress, opening the way for that intelligent legislation which the Lehrstand or general estate of education in this great Republic requires.

Much has been done already by the efficient labors of the present Commissioner of Education; and I feel sure he will not regard it as at all offensive that I have urged a larger grant of power and a closer organized relation of such general work to that carried forward through the various States and Territories of the Government.

Other points have suggested themselves to my mind; but I fear I have already consumed too much time. Therefore, asking your friendly forbearance if I have touched upon no topics which may elicit profitable discussion, I will close this paper, hastily written amidst the pressure of official business, assuring you of my zeal at least in the work, if it be not according to knowledge.

In the discussion following the reading of Dr. Higbee's paper, Mr.

NEWELL said: I will merely say that the best way in which a superintendent can advance the interests of education will depend upon what kind of man the superintendent is. We are not all elegant scholars and profound philosophers, and therefore we cannot all present such admirable discourses as Dr. Higbee has given us to-day. But some of us may have capabilities in other directions, and our business as State superintendents is for each to use his best energies in his own line. One of us may be a politician, who knows how to log-roll and pull wires, quietly, respectably, but effectually. Now, the best thing he can do is to be a politician on behalf of public education. But a man may be unacquainted with politics, either in the fine or in the rough, and he may be a stump speaker—I suppose we have such among us. Let him go into the highways, bring the people around him and tell them what he knows about the public schools; tell them his experiences as an educator and how the advantages of superior education can be brought to the lowest as well as to the highest in the land by an efficient administration of our unrivalled public school system. But, on the other hand, a State superintendent may not be a politician; he may not be a stump speaker; he may be like your humble servant, nothing but a poor teacher, or even schoolmaster. If he knows how to teach let him go before the public and tell them what he knows about teaching. Let him talk about the topics of the day, about "corporal punishment" or "moral suasion;" about "recess" or "no recess;" but let him speak as one who knows, one who can speak from personal knowledge derived from experience. Let him go before the people, then, as a teacher, if he is a teacher.

But it may happen that a man may not be a politician; that a man may not be a stump speaker; that he may not be a teacher; that he may be nothing but a State superintendent. In that case let him do nothing; it is the best service he can render to the country. In short, the best service any man can render as State superintendent is the best service he can render as a *man*. It is the man that ennobles the office, not the office the man.

Messrs. Speer and Akers, who were announced to take part in the discussion, had not arrived in Washington. Upon motion the meeting then adjourned.

SECOND SESSION—WEDNESDAY EVENING.

WASHINGTON, *February* 13, 1884.

The members of the Department and their friends assembled in the hall of the high school at 8 o'clock P. M. The president called the meeting to order and introduced the first speaker, Dr. J. W. DICKINSON, who spoke as follows:

NATIONAL AID FOR THE SUPPORT OF PUBLIC SCHOOLS.

The term education is used in many senses. Some use the words education and knowledge as equivalent terms. In this sense a person

is educated in proportion to the amount of knowledge he possesses. Some consider education to be skill in the use of knowledge. In this sense one is educated who can realize his knowledge in some objective form. Others mean by education something back of knowledge and of activity. They use the term to signify a state of the mind in which it has the ability and the inclination to produce the most and the best results it is within the sphere of the human faculties to attain.

If this is the legitimate signification of the term education, then we may consider the thing signified to be a constituent element of the mind itself, an element which the mind may be constantly adding to itself by its own activity.

When the mind of the child begins to act it has no facility in the exercise of its powers; nor has it any inclination to act in a particular way, for it has not yet formed habits, it has no education. But as soon as the world without the child begins to hold a relation to the world within him his mind will move itself in producing the mental states of thinking, feeling, and choosing which external things are adapted to occasion. The activity thus excited will leave its impression on the mind that acts, and the educating process has commenced. This process will continue until the character of the child's mind is formed and his destiny is fixed. From this we may infer that it is education chiefly that gives to every man his place in life. Not that education alone which school exercises are adapted to occasion, but that which is occasioned by whatever awakens the mind to activity from without or by whatever moves it from within.

History and reason both testify to the fact that whatever we would have appear in the citizen or in the nation we must first put into the schools. Indeed, a nation is possible only so far as citizens can be trained in the schools to think alike and act alike. The nations of antiquity organized their schools with especial reference to cultivating the national spirit. It was not until after the birth of the Greek and Roman republics that children were trained as ends to themselves. National education, existing to the exclusion of individual, will make quiet subjects of arbitrary power; but if there be added to national education that which develops the individual, the foundation is made for free institutions and for communities governed by self imposed rules.

No general and systematic education can be produced except by well organized schools. No systematic education containing the two elements national and individual development can be produced except in the schools of the people, and public schools can never be established or sustained except by public authority and by public funds. It is folly for a people to organize themselves into a free state and attempt to promote or to perpetuate its institutions without providing by law for universal education, which shall be at the same time compulsory and free. The government of a free state, that it may exist and be able to

exercise its own proper functions, must provide those institutions which shall educate the people into harmony with itself.

Does our National Government hold such a relation to the people that, in accordance with its Constitution and laws, it can justly and legally aid the people in organizing and supporting a system of public schools? This question may be answered by showing, in the first place, what a republican state or nation is and for what it may properly exist, and by showing, in the second place, the relation that the enumerated powers granted by the Constitution hold to the incidental or implied powers.

A republican state is a community of persons living within well defined limits of territory and under a permanent organization, governed by self imposed rules for the purpose of securing to themselves the enjoyment of the objects of their natural rights and the means of personal and social development.

If this is the true definition of a free state, it follows that the state and the people are one, that the state exists for the good of the individuals which constitute it, and that the state may justly do anything which is necessary to be done to secure the protection and development of its citizens which the citizens cannot do each acting for himself alone.

It may be shown that the degree of protection a state can afford its citizens will always be equal to the right development of their minds. One must be trained to think, that he may become an intelligent, conscientious subject of just laws. His faculties must be properly trained that he may have intelligence to discover what are the rights of men and what are the obligations arising from them, that he may know the relations which individuals hold to society and be able and inclined to perform all his public duties. The state, that it may become the successful guardian of the rights of the people, must become the founder and supporter of public educational institutions.

"A nation," said John Milton, "ought to be as one huge christian personage, one mighty growth or stature of an honest man, as big and compact in virtue as in body; for look, what the ground and causes are of happiness to one man, the same ye shall find them to a whole state."

"The state," says Lieber, "is a form and faculty of mankind to lead the species toward greater perfection."

Civil constitutions and civil laws are simply rules of conduct. If they are wisely made and justly executed by the governing power of a free state, there must be implied in these acts the existence of intelligence and the power of self control generally diffused among the people; for, as has already been said, the governing power is the people themselves. As knowledge and self control are the products of education, or rather as one is the product and the other is education itself, it would seem absurd for the governing power of a republican state to establish a constitution or enact laws which should neither expressly nor by implication grant the right to itself to give national aid to the

people in support of their public schools; for withholding from itself this right would be equivalent to forbidding what may be necessary to its own existence. "The authority to educate is a constituent part of the right of self preservation which the nation may exercise as well as any individual citizen." "As every natural person may take due measures for his own improvement, so every artificial or corporate person may do the same."

From what has been said, the justice and wisdom of granting aid in the support of public educational institutions, by a national tax, if necessary, can hardly be questioned. But still it may be said that the fundamental idea of our national Constitution is that the people are sovran and that as a nation they can do only what the Constitution which they have established permits. "This must be admitted to be true, and yet there is nothing in the Constitution of the United States which excludes incidental or implied powers." "The Articles of Confederation gave nothing to the United States but what was expressly granted, but the new Constitution dropped the word *expressly*, and left the question whether a particular power was granted to depend on a fair construction of the whole instrument. No constitution can contain an accurate detail of all the subdivisions of its powers, and of all the means by which they might be carried into execution." "Its nature requires that only the great outlines should be marked, and its important objects designated, and all the minor ingredients left to be deduced from the nature of these objects. The sword and the purse, all the external relations, and no inconsiderable portion of the industry of the nation were intrusted to the General Government; and a Government intrusted with such ample powers, on the due execution of which the happiness and prosperity of the nation vitally depended, must also be intrusted with ample means for their execution." "The Constitution has not left the right of Congress to employ the necessary means for the execution of its powers to general reasoning." Article I, section 8, of the Constitution expressly confers on Congress the power "to make all laws which shall be necessary and proper to carry into execution the foregoing powers." "Congress may employ such means and pass such laws as it may deem necessary to carry into execution the great powers granted by the Constitution." "The powers of the Government were given for the welfare of the nation. They were intended to endure for ages to come, and to be adapted to the various crises of human affairs." "If the end be legitimate and within the scope of the Constitution, all means which are appropriate and plainly adapted to this end, and which are not prohibited, are lawful."

This opinion of Chancellor Kent is entitled to great weight, not only as authority, but as in accordance with the highest reason and an inevitable deduction from necessary truths.

It is admitted that every government, whether national, State, or town, must be vested with incidental powers, that it may exercise in a

free, intelligent, and efficient manner powers expressly granted. It should be admitted also that incidental and enumerated powers bear a relation to each other, the nature and extent of the latter always determining the nature and extent of the former. Examples illustrating this truth may be readily given.

The constitution of the United States guarantees to every State a republican form of government. The history of the race and the nature of man both teach us that this is impossible except the people are trained together in the public schools. Therefore the obligation to establish republican institutions implies the power to establish educational institutions adapted to create the republican spirit. Again, power is expressly granted to provide for the general welfare of the people. But without a general diffusion of knowledge and a right training of the minds of the people, their general welfare cannot be provided for. Therefore the express power to provide for the general welfare implies the power and the duty to provide common schools as the necessary means by which this great end is to be accomplished.

To fail to educate the people is to fail to guarantee to them a republican form of government or to provide for their general welfare. The founders of the Government of the United States never intended to frame a constitution which should forbid the governing power of the nation to make education compulsory, if necessary, and if necessary to grant aid in the support of public schools. This truth may be derived from a just analysis of the Constitution itself and from the history of our national legislature during the constitutional period of our Government.

Appropriations of public money have been made by the National Government to establish and support agricultural colleges, the Smithsonian Institution, Indian schools, and the Bureau of Education. In earlier times the principle of granting national aid to educational institutions was accepted by the Congress of the Confederation in the acts which devoted one-sixteenth of the public lands of the nation to the support of public schools in the new States. This amount was afterward doubled, and through all the subsequent history of our constitutional government it has been the policy of the nation to grant national aid in support of public schools.

Although the education of the whole people is necessary for the continued existence of the Republic and notwithstanding the supreme law of the land may sanction that legislation which contributes of the resources of the nation to the support of public educational institutions, still, if the individual States and yet smaller political units can do this work of education for themselves, then the National Government may well leave it in their hands.

But what are the facts bearing on this point of ability of the States to educate each its own people as they must be educated that they may become safe and efficient citizens of a free commonwealth? This is a

question of deepest concern to the Government of the United States. It may be answered by a careful reference to the amount of illiteracy in the several States and to the means which they possess for its removal.

The returns of the last census show that the total population of the United States is a little more than 50,000,000; that the school population is about 15,300,000; that 9,780,700 are enrolled in the public schools and 567,000 in the private schools; and that the average daily attendance in the public schools is 5,804,993. Thus it appears that more than one-fourth of the school children of the country are out of school altogether and that but little more than one-half of those enrolled on the registers of the schools are in regular attendance upon them. As a result of the non-attendance and of the irregular attendance of so large a number of children of school age, there are in the United States nearly 5,000,000 persons who, at ten years of age and over, cannot read and more than 6,000,000 who cannot write. The percentage of total population who cannot read is 9.82; of those who cannot write, 12.44.

From these returns of the last census it appears that the States have a great, important, and difficult task on their hands, to extend their public school systems over all the school population and to collect all the children into the public schools. But, if we analyze the returns, we shall find that the burden of this enormous work rests unequally on different parts of the country. Besides, it should not be forgotten that ignorance has a tendency to perpetuate itself and increase. It is almost impossible, in a partially educated community, to excite that interest in public schools which is necessary to lead the people to make the sacrifices necessary for their support; and, more than this, the opposition of a portion of the people in such a community to the support of schools at public expense is not unfrequently so violent as to paralyze all efforts of the friends of education to establish them. In such a condition of things external aid must be rendered until efficient educational institutions are established on a firm basis and a generous public sentiment is created in their favor.

It is in accordance with a sound philosophy for the National Government to do anything and everything, as far as its ability extends, which is necessary to be done for its own preservation and for the development of its people which the States or the people cannot do as individuals acting alone.

Ignorance is a dangerous element in any community. It always has proved and always will prove fatal to republics. For this reason and for the sake of the citizens considered each as an end unto himself, our Republic should make all possible haste to render universal those institutions which have for their object intelligence and virtue.

Reason and the public sentiment of the country unite in urging our National Congress to grant immediate aid to those sections of the Republic that are struggling to help themselves into the possession of

institutions which seem to be the only possible means of preparing the people to be free. Congress should pass a bill in aid of establishing and supporting those schools at least which furnish the means of elementary instruction. And, that these schools may be supplied with competent teachers, aid should be furnished for establishing training schools, teachers' institutes, and normal schools. The funds provided should be distributed on the basis of illiteracy, for in this way those who need the aid will receive it. The distribution should be made by State agencies, made responsible to the Secretary of the Interior, through the Bureau of Education. This will render unnecessary the creation of new offices and prevent the clashing of conflicting authorities. No State should receive its share of the fund until it has raised for its own schools an amount equal to at least one-third of what it would receive from the national treasury, for this would require the States to use their powers in helping themselves in proportion as they are helped.

The aid should be furnished at once, for when the nation is in peril there is no time to be lost. And, finally, the authority of administering the law granting the aid should be vested in the Secretary of the Interior, for then the same power that made the law could compel its faithful execution.

It should be remembered by every patriotic citizen and every intelligent statesman that the education of the people is one of the requisites of a free state; for a general intelligence, with its attendant virtues, is necessary to the existence of the republican spirit. Plato says that the greatest good of a state is unity; the greatest evil, discord and distraction. And there will be unity when, if one member suffer, if one citizen be touched, all are quickly sensitive, and the least hurt to the smallest part of the state runs through the whole body and vibrates the soul.

A common sympathy among the people of a country is necessary to the existence of that national spirit which alone can produce unity and stability. Such a sympathy is the result of a good education made common to all. Why, then, should not the governing power of the Republic make all possible haste to strengthen the weak places within its borders, by giving direct aid to those who at present are unable to help themselves; and who has ever presented a reason or who can present one worthy of the attention of a thoughtful American citizen against receiving with joy all that will be likely to be given?

THE EDUCATIONAL STATUS AND NEEDS OF THE NEW SOUTH.

President Butcher then introduced Major ROBERT BINGHAM, of Bingham School, North Carolina, who addressed the meeting as follows:

MR. PRESIDENT, LADIES AND GENTLEMEN: I appear before this highly cultured audience, composed almost entirely of northern men and women, to tell of the educational status and needs of the South, and I

wish you to understand distinctly that I am a southern man, of southern birth, of southern blood, of southern education, of southern record, of southern prejudices, if you will. I was a confederate soldier. I saw the last sun rise on the army of Northern Virginia. I was one of Lee's 7,500 armed men at Appomattox Court-House, who never bowed the knee to any Baal, but fought to the bitter end. And it was a bitter end: but these bitter pangs were the birth pangs of the new South, which, though still in its swaddling bands, is greater and more powerful in some respects than the old South, and which will soon be greater and more powerful in all respects than the old South could ever have been.

When the bitter end came we surrendered in good faith. We accepted the conditions, and having done our duty as we saw it in one direction we laid down our arms and betook ourselves to repairing the wreck and ruin around us. It was folly to stand, like the figure at the stern of a vessel, looking backward and weeping over the troubled waters behind. The Almighty gave man eyes in front only, that he might look to and live in the present and future.

The past of the South is irrevocable, and we do not wish to recall it. The past of the South is irreparable, and we do not wish to repair it; for, terrible as the lesson was in the learning, there are two propositions which meet with universal acceptance in the new South: first, that the greatest blessing that ever befell us was a failure to establish a nationality; and, second, that the next greatest blessing was getting rid of slavery on any conditions. A few of the older men—stranded wrecks of by-gone days—may cling to the dead past; but their influence has ceased, and, like giants Pope and Pagan in Pilgrim's Progress, they are harmless.

With regard to slavery, the men who are the motors of the new South reason very simply and conclusively that before the war, with organized labor and organized capital, the South made a little more than 3,000,000 bales of cotton. In 1880, only fifteen years after the surrender, with disorganized labor and with no capital but the growing crop, we made more than 6,000,000 bales of cotton.

North Carolina made 140,000 bales of cotton before the war and 25,000,000 pounds of tobacco, and in 1880 she made 400,000 bales of cotton and 50,000,000 pounds of tobacco and as much grain as before; that is, we have as much to eat as we ever had and we handle twice as much money; and at this rate it will not take many years to make up for all our losses by the war; so that the wayfaring man must be an enormous fool if he cannot see that, as 6,000,000 bales of cotton are better than 3,000,000 bales, so the present conditions will soon be better financially than the conditions before the war.

Again, we see the impossibility of a southern nationality as plainly as we see the difference between the 6,000,000 and the 3,000,000 bales of cotton.

Every student of history must recognize the fact that the most marked

characteristic of the Teutonic man, the man of the ages, is his intense instinct of local self government. It was this instinctive fear of centralization that divided the England of the Angles and Saxons into a heptarchy before the infusion of centralizing Norman blood, and the same instinct has divided the Teuton beyond the German Ocean into so many petty independencies that the unification of Germany is an unsolved problem still. This same instinct of local autonomy prevailed after the revolutionary war to such an extent that a Federal Union on any basis was of very difficult accomplishment, and the State rights theory prevailed so fully as a theory that it was taught even at West Point fifty or sixty years ago; insomuch that if any of the West Point graduates who became confederate leaders had been tried for treason one very strong point in their defence would have been the text book on constitutional law used at the Academy while they were there, in which the State rights theory was distinctly taught. And the United States could not have considered it treason in *men* to practise what the United States taught them officially as *boys* to believe.[1]

Now, in contrast to this denationalizing teaching at West Point fifty years ago, I wish to give you, very briefly, the kind of instruction which I, a southern democrat, give my pupils—instruction which last summer I was called upon to repeat at three of the four State normal institutes in North Carolina, before nearly 1,000 teachers of common schools. It illustrates the manner as well as the animus of the instruction given in southern private and public schools.

"Geography," I said, "by derivation, means earth writing, as telegraphy means far writing and photography means light writing. There are two kinds of earth writing: man's, which is political geography and is feeble and ephemeral, and God's, which is physical geography and is strong and eternal, predetermining climate, population, and the history of nations.

"One of the most distinctive features of physical geography is that there are almost always some strong, bold strokes of God's earth writing between nationalities. Nations have very rarely crystallized except behind natural barriers. Take China, for instance, a triangle with the highest mountains in the world to the southward, with mountains equally high, climatically, to the northward, and with the greatest of oceans to the

[1] The following letter is my authority for this statement:

4117 PINE STREET, PHILADELPHIA, *March* 25, 1884.

DEAR MAJOR BINGHAM: While the question of Jeff. Davis's trial for high treason was pending, Mr. Reed, counsel for the defence, was a member of my brother's congregation at Orange Valley, N. J. He told my brother, after it had been decided that the trial was not to take place, that if the case had come to trial the defence would have offered in evidence the text book on constitutional law from which Davis had been instructed at West Point by the authority of the United States Government, and in which the right of secession is maintained as one of the constitutional rights of a State. You are quite at liberty to refer to me for this statement, which is given according to my best recollection.

Very truly yours,

L. W. BACON.

east. In this triangle, separated from the rest of mankind by impassable barriers on all sides, constituting the boldest strokes upon the earth of God's earth writing, the most remarkable civilization among man has been developed; for, while a succession of western empires have risen, culminated, and passed away, the Chinese civilization, defective as it is in many respects, surpasses all others in having attained continuity. Man may come and man may go, but the Chinaman goes on forever; for God's earth writing isolates him completely.

"In Europe we find nationalities separated by natural barriers. The Pyrenees separate France and Spain; the Alps separate Austria and Italy; the Rhine flows between Germany and France; the thread of silver sea between England and the mainland has been a wall of fire which no alien enemy has dared to cross since the days of William the Norman.

"Civilization, like solids in solution, does not crystallize while motion continues. A natural barrier stops migration and national peculiarities develop during the temporary rest. But when the peoples on opposite sides of an intervening barrier evolve organization enough to overcome the barrier, they meet with developed peculiarities which make them different and which make them enemies.

"In the United States we find physical features bold enough for barriers between nations in the Appalachians, in the Mississippi, in the Rockies; but these lines of God's earth writing run north and south, at right angles to the lines of population, and did not stop migration. A father reached the Appalachians; a son and a daughter settled on this side of the mountain; a son and a daughter crossed the mountain, and the mountain separated a homogeneous population. The same was the case with the Mississippi, the same was the case with the Rockies.

"What we of the South tried to do was to establish a nationality along a line 3,000 miles long from east to west, where there was not a stroke of God's earth writing to separate one nationality from another, and the Almighty, who had written this country one with His earth-writing pen, spurned our efforts, though man fought for a nationality never more boldly before."

Such is the instruction given to my own pupils, who come from every State in the South, and, by request, to nearly a thousand teachers of public schools last summer. Now, contrast the theoretical disunion taught at West Point fifty years ago from man's standpoint and the practical union from God's standpoint, impressed upon the pupils of a private school and upon nearly a thousand teachers of public schools last year by a southern democrat, in a Southern State, and ask yourselves if the years have wrought no changes.

But when the war ended we of the South were the poorest people in the civilized world. We staked everything unreservedly upon the decision of the sword and lost. The intensity of the struggle is not realized by the people of the Northern States. A comparison between

the men under arms during the revolutionary war and during the late civil war illustrates this point. In 1776 the Colonies numbered 3,000,000 and never had more than 30,000 men under arms at one time; that is, $\frac{30,000}{3,000,000}$, $\frac{3}{300}$, $\frac{1}{100}$ of the population were under arms at once.

In 1861 North Carolina had 600,000 white inhabitants; 60,000 of them were under arms at one time; that is, $\frac{60,000}{600,000}$, $\frac{6}{60}$, $\frac{1}{10}$ of the population were under arms at one time; so that, in proportion to population, North Carolina was engaged ten times more intensely in the late war than our ancestors were in the war with England; and, to illustrate what ten times anything means, I call your attention to the fact that a race-horse only moves six times faster than a man in a rapid walk, and a railway train, at the overwhelming speed of forty miles an hour, moves only ten times faster than a man walking rapidly down the track; so that the speed of a railway train at forty miles an hour and of a man walking rapidly bear the same proportions to each other as North Carolina's share in the war between the States and the share of the Colonies in the war with England. And when the conflict ended in which we staked our all, we had nothing left but the ground we stood upon and were deeply in debt besides.

The comparative wealth of two sections of the United States is illustrated by the fact that in 1880 the taxable wealth of New York City was equal to that of Virginia, Kentucky, Georgia, and Texas. The taxable wealth of Boston was equal to that of Virginia and Kentucky. The taxable wealth of Rhode Island, with only one-forty-seventh of the area, was equal to that of Georgia. The taxable wealth of New York State, including New York City, was equal to that of the whole thirteen Southern States, with an extra State equal to Georgia thrown in for good measure.

In short, the Federal dollar started at a dollar in gold, went down to 33 cents and then back to a dollar, and those who claimed it as their dollar became very rich; but the confederate dollar, which started at a dollar in gold, went down to absolute zero and staid there, and we were left with nothing but our manhood. And if those to whom the war was such a source of wealth should ever attempt to inaugurate another war involving the integrity of the Federal dollar—the dollar which we are now beginning to handle—we of the South, to whom the war was a source of such terrible poverty, will guard the integrity of the Federal dollar, if need be, with bullet and bayonet.

But, with all our losses by the war, our manhood remained. In fifteen years after the war ended, with no basis of credit but the growing crop of each year (which has been mortgaged ahead ever since the surrender in order to raise the means for its own cultivation), we had doubled the number of bales of cotton; we have taken a dollar's worth of cotton and manufactured it into coarse fabrics worth \$2, and thereby have forced the New England spinner to make finer fabrics, thus increasing the value of one dollar's worth of cotton to \$4.

It is safe to say that no conquered people ever showed such powers of recuperation. The example of France, after the Franco-Prussian war, is often referred to; but France lost very few men on the battlefield; they were all captured; France spent but little money on military equipment; she had very little military equipment; and so the money was all in the country, intact, to pay the German indemnity after the war was ended, and was actually produced for this purpose.

Another thing which I wish to mention is the fact that we have no prejudice against northern men or northern ideas per se. There were recently five of my own former pupils learning the business of cotton-spinning at the same time in the mills of Lowell and Fall River at ordinary mill operatives' wages, and the fathers of these young men are our most prominent people and were all slaveowners before the war. Again, the teachers in our public schools have gone to New England in large numbers (I can mention at least twenty-five myself) to inspect the public schools. Northern experts have superintended our teachers' institutes from year to year. After some weeks spent looking at the working of the public schools in Massachusetts, I was called upon at our university normal school to tell about what I had seen. I said, "That, with nothing in the heavens above, the earth beneath, or the waters under the earth to build a prosperity upon, the people of Massachusetts are, per capita, the richest people in the world. The country produces nothing but granite and ice; and yet I was told that the average per capita wealth of Boston is over $1,700 and of the whole State over $1,000; they have the best intercommunication in the world, the greatest distance of a man's house from a railroad station in Massachusetts being 10 miles and the average distance not being more than 3 miles; and they pay the highest per capita school tax in the world: and thus it becomes us to find where the secret of this Samsonian strength lies."

And when some one said that I was turning "Yankee," I went on to say "that I had seen some other things. I saw a free school-house built with tax money, which cost $750,000; I saw the names of 100 free school teachers, head masters of the Boston schools, who got nearly four-thousand-dollar salaries; I saw women (there are about 100 of them in Boston, free school teachers) who get twenty-eight-hundred-dollar salaries. Now, there are," I said, "three hundred and fifty teachers present, and you know that you do not get more than an average of $25 per month, and you don't get that for more than four months in the year; and you know further that if you could superinduce a set of conditions under which the best man among you would have a chance at a four-thousand-dollar salary as free school teacher, $1,000 more than our governor gets, and the best woman among you a chance at a twenty-eight-hundred-dollar salary as a free school teacher, $300 more than our chief justice gets, if you could do this you know very well that you would all turn Yankees unless you are idiots."

To illustrate further the feelings of our people, I wish to say that, at

first, there was a good deal of prejudice in our minds against those who came from the North to teach the freedmen. Some of this prejudice was reasonable, some of it was not. Unreasonable prejudices have passed away. Six years ago the Virginia Educational Association, composed almost entirely of ex-confederates, met in the buildings of the Hampton Normal Institute. Many of the members were entertained by the superintendent and his colleagues, and it was then that I first enjoyed the privilege of becoming acquainted with General Armstrong and his wonderful work.

About ten years ago a missionary of the Northern Presbyterian Church was driven by the climate from his work for the heathen in tropical Asia and asked to be put into some mission field where the climate was not prohibitory. He was sent to North Carolina and put in charge of a school for colored men.

He came to do good, not harm; to quiet the troubled waters, not to stir up their mire and filth; he came as a teacher, not as a carpet-bag politician; he came to work for God and for good, not for the republican party, though I think he has always voted the republican ticket. Now this northern educator of colored men, this head of a negro school, is cordially received in any pulpit in the State and is a favorite preacher with the young men attending the leading denominational college of the Southern Presbyterian Church, and *young men and boys are more sensitive than older men.* Further still, one of his daughters taught, till her marriage, in the largest female school in North Carolina and with unusual success. Another daughter taught in the most successful female school in Virginia for several years, where she was pressed to remain, but she resigned her position in Virginia to accept a position in a very prominent female school in the same town in which her father teaches colored men; and our people are much more sensitive about their girls than about their boys. I mention these things because I know them to be facts. I have seen them with my own eyes, and I have permission from the parties concerned to give the names, dates, and localities in full if it is desired.[1] An ounce of fact like this is worth ten tons of theory based upon statements made in some sensational book or by some sensational newspaper scribbler or upon the opinion of some one who rode through the South on a railroad train and thought that the information thus gained was sufficient to base an authoritative opinion upon.

Again, the public schools for both races in Wilmington are in the hands of the same white superintendent, and this superintendent, the first man of southern birth who ever had charge of the schools for both races in North Carolina, was a pupil of my own, and was teaching for me when he was called to take charge of the public school work in Wilmington, our largest city, at the highest salary ever paid up to that

[1] For particulars address Rev. Dr. Mattoon, Rev. W. R. Atkinson, Charlotte, N. C.; Capt. J. B. Burwell, Raleigh, N. C.

time to a public school teacher in North Carolina. The example set by Wilmington has already been followed by Charlotte and Winston.

While these things have nothing to do with the social relations of the races, which will regulate themselves, as social relations regulate themselves everywhere—for "the hand of Douglas is his own"—yet such facts as these must tend, I think, to correct misapprehensions which I found existing in the minds of northern people, among whom I have spent several months within the last three years.

I wish to correct another misapprehension which I found common among New England people, as to what we are doing ourselves for education. I take North Carolina and Massachusetts as the units of measure. In 1880 the taxable property of Massachusetts was $1,600,000,000 and the school tax was $4,000,000; $4,000,000 out of $1,600,000,000 is $\frac{4}{1600}$, $\frac{1}{400}$; that is, Massachusetts pays for school purposes $1 a year out of every $400 of taxable property. In 1880 the taxable property of North Carolina was $160,000,000; the school tax was $400,000; that is, $4 out of every $1,600—$\frac{4}{1600}$, $\frac{1}{400}$—$1 out of every $400 of taxable property, which is exactly what Massachusetts gives; and it is much harder to give a little out of a little than to give much out of much. Our Lord emphasized this when He said that the widow's mite was more than the rich, of their abundance, had given; and in the South since the war the school tax is but too often literally the widow's mite. And, what is more, ninety-nine-hundredths of what is raised in North Carolina is paid by the white people and three-sevenths of it goes to the children of the blacks. And, besides the State tax, many of our towns tax themselves and keep up schools eight or nine months in the year; so that, as a matter of simple fact, four-sevenths of our population raise as much by taxation as seven-sevenths of the population in Massachusetts do on every one hundred dollars' worth of property, and tax themselves heavily besides to continue the schools after the public money is exhausted.

I came here to ask for national aid, and I mention these things to show that we are not paupers, but that we are doing much more for ourselves than the people of Massachusetts are doing for themselves, in proportion to our means, and are "carrying" the blacks besides, who contribute almost nothing to the school fund and get three-sevenths of its proceeds.

And we have other terrible difficulties to contend with. We have 1,400,000 people in North Carolina (taking North Carolina and Massachusetts again as the units of measure), which is 300,000 less than the population of Massachusetts; but the area of North Carolina is seven times as great as the area of Massachusetts, and the difficulty of reaching so sparse a population is very great. And not only so, but in Massachusetts 900,000—more than half of the people—live in cities and towns of as much as 2,000 inhabitants, while only 60,000—one-twenty-third of the people in North Carolina—live in towns, and the rest—twenty-two-twenty-thirds—live scattered over an area seven times as large as Mas-

sachusetts, larger than New York, and nearly as large as all New England, and many of them are 100 miles from a railway and 20 miles from a post office, with its mail only once a week. That is, with only one-tenth of the money which Massachusetts has, North Carolina must reach seven times the area: which makes our difficulties seventy times as great as those of Massachusetts even if area and money were the only factors.

Another great difficulty is the illiteracy of our people. I have been frequently called upon to talk to the people of my native State upon the subject of education, and when I get a set of North Carolina people together I talk very plainly and tell them exactly what the situation is, as I see it. I say that there is one black fact which we must meet. The illiteracy of white people in North Carolina is somewhat greater (according to the census of 1880) than anywhere else where God's sun shines upon the English-speaking man. But if a Virginian, a South Carolinian, a Tennesseean, or a Yankee were to come to North Carolina and violate the law of courtesy (which is as much a law of God as the law against murder or against stealing) by talking about our illiteracy or about any other defect, however freely we may talk of it among ourselves, I would help to put him in the horse-pond; and any one of you would do the same thing if a stranger were to make himself disagreeable by abusing your people.

Before the French Revolution there were 28,000,000 people in France, of whom 27,000,000 were illiterates; and look at the result.

In North Carolina, and, indeed, in the whole South, nearly half of our people, white and black, are illiterate; and, while we do not expect any such calamity as befell France, we are too near the ragged edge when so large a proportion of those who at the polls decide the destiny of the country cannot read the votes they cast, and so are tools for demagogues, and we cannot afford to risk our prosperity and our lives upon such conditions. It is to wake up our people to their danger—to show them the rod they are cutting for their own smiting—that we talk to them as we do. And it is stirring them up. But we cannot permit any outsider to talk in that way.

And our people have been aroused. Our public schools are doing the best that can be done under such circumstances. We tax our dollar as heavily as Massachusetts taxes hers, as I have already shown, and yet we keep our public schools open only three months in the year, and pay the teachers, on an average, $25 per month for their work and they board themselves. By our constitution, which is a legacy of the period of reconstruction, we cannot tax our people more than so many cents upon the dollar, and that limit has been reached. In the towns a local option tax is levied (understand that the words "local option" suggest public schools with *us*, and not whiskey, as with *you*) and very excellent public schools are kept open for nine months; but in the *rural districts*, where all of our people live but about 60,000, the limit of taxation has been reached, and the schools cannot be kept open any more than three months in the year.

But our poverty, the fact that we have no accumulated capital, and that each prospective crop is made by a mortgage on itself, so that ever since the war we have been trying the difficult feat of pulling ourselves up by our own boot-straps, so to speak—all these things are smaller difficulties than the duality of our civilization, the presence of two races upon the same soil, and this duality we must look squarely in the face.

Ladies and gentlemen, a very large proportion of you are from the North. I came here to conciliate, not to offend you; but I tell you that the great mass of your people, however much you may think you know about it, are profoundly ignorant of the conditions in the South and of the relations between the races.

In the North one-sixtieth of the population are of African blood. In the whole South one-third are of African blood. In the Gulf States more than one-half, in some States more than three-fifths, and in localities in all the former slave States nine-tenths of the population are of African blood. We know more of these people than you do; whatever may be the feeling toward them collectively, we have a kindlier feeling for them personally and individually than you have; we know how to work with them and for them better than you do. As a simple matter of fact, I have hardly ever known a northern man since the war to get along with them as laborers and I have not known a northern woman since the war to get along with them as house servants at all.

These people have deserved well of us. I say this everywhere and always. They have behaved with more quietness and with less violence than any people ever behaved before upon the face of the earth under circumstances in anywise similar. I was reared in a slave woman's lap; I was interested in slave property; several hundred freedmen have been employed in my business since the surrender, and I have never had an unkind word nor have I ever lacked for a kindly service from one of them. The men who lead public sentiment in the South realize that the negro is the youngest child of civilization, and that it is our interest, as well as our duty, to aid in his development; and the history of the world does not show any other example of such development from savagery to civilization as among the southern negroes.

Compare the negro as he is in the South to-day—the quiet, peaceable, industrious citizen, the labor of whose hands produces six million bales of cotton annually—compare him, I say, with what he was one hundred years ago; compare him with what his cannibal, savage kindred are now in Africa; compare the southern negro, who has received nothing but the ballot from the United States Government and who produces six million bales of cotton annually—compare him, I say, with the American Indian, whom the United States Government has had in its special charge for one hundred years and on whom millions have been spent and who produces absolutely nothing. Make these comparisons and ask yourselves if any savage race has ever shown such development in so short a time.

The Sandwich Islander alone can compare with the American negro in development; but while this development has been a blessing to him intellectually and morally it has deprived him in a great measure of his powers of procreation; children are born to him no longer, and the race "is wearing awa' like snow wreaths in thaw" before the sun of civilization under which the southern negro has increased in numbers as rapidly as he has intellectually and morally.

But the two races in the South must be dealt with separately. The continued duality is an absolute necessity. The load of the country in the South must continue to be pulled by a double horse team, so to speak, with the white horse "in the lead" and the black horse on the "off side," to use our farmers' phrase; and, to change the figure, a European man, with a thousand years of culture on his back, and especially an Anglo-Saxon man, God's king of men, is, will be, and must be ahead of an African man, with only a hundred years of culture on his back, and eighty of that spent in slavery; and any forced change of the relations will be fatal to the weaker race in the South, as force has been fatal to weaker races always and everywhere; and nobody knows and acknowledges the fact more fully than the blacks themselves. The white and the black horse work very kindly together without, to use our farmers' phrase again, even a "bearing stick" between them; for they know that they are pulling the same load, upon the same "doubletree," and they know that it takes them both to pull it. But you cannot grind the two horses up and make one huge Bologna-sausage-white-and-black horse of them.

Employers and employed, even of the same race, however harmonious their relations may be economically, occupy different social planes everywhere in the world, and when the race question comes in, as it does with the Anglo-Saxon man and the Irish man, and especially with the Anglo-Saxon woman and the Irish woman, in Massachusetts, with the Anglo-Saxon and the yellow man on the Pacific coast, or with the Anglo-Saxon and the black man and woman in the South, it must settle itself, as it settles itself the world over. There can be no middle ground about it, until the flood of years deposits a middle ground from its current, as the Nile or the Mississippi deposits its delta from its own waters.

In my intercourse with northern people I have found a good deal of misapprehension on this very matter. They think that the white people have driven the negro out of the synagogue. But this is a great mistake. Though he is the youngest child of civilization, he is in one thing just as "smart" as Julius Cæsar. When Cæsar was crossing the Alps, one of his staff said that the little Alpine village through which they were passing, with all its disadvantages, had this great advantage, that no one of its inhabitants had any ambition. "Yes," replied the great Cæsar, "but I would rather be first in this Alpine

village than second at Rome." The colored man feels his race inferiority. He knows that if he remains in the white church he must "take a back seat." If his child goes to the white school, he knows that his child will feel uncomfortable, no matter what the teacher or the other pupils think and feel about it, just as a half grown, gawky boy feels uncomfortable in a company of gentlemen and ladies, however kindly their feeling may be to him; and so the colored man has simply moved his church to "Alpina," where he can be first, without let or hinderance; and hard by his church is his school, where his child can be first, without let or hinderance. It is as much against his nature for the southern negro to worship in the white church and for his child to learn in the white school as it is for the wandering Arab to live in a house or the Anglo-Saxon in a tent. This feeling was as distinct in Boston fifty years ago as it is now in the South, and it would be distinct in Boston to-day if there were negroes enough in Boston to form separate churches and schools. It is barely possible that it may be different in the South fifty years hence, but a physician does not ask what his patient's symptoms may be in fifty years; he asks what they are now, and treats the case accordingly. These social relations must be left to take care of themselves in the South, as they are left to take care of themselves everywhere else in the world. Neither race will brook any interference in this matter. And yet, with all our race instincts, stimulated as they have been by circumstances, there is to-day less race prejudice in the South than in the North. Let me give you a practical example—not one that I read about, not one that I heard somebody else tell about; I have not dealt in a single such so-called "fact" since I began to talk to you. I have told you of things which I have seen with my own eyes. I will not refer to the way in which the northern people have driven the Chinese, not only out of the synagogue, but out of the country—for that might seem political and might be disagreeable—but I think I am safe in saying that there is scarcely a community in the North where a colored mechanic enjoys the rights of equal manhood as he does everywhere in the South to-day. If a contractor in Massachusetts or Michigan had twenty white bricklayers and twenty white carpenters employed, and were to employ five colored bricklayers and five colored carpenters at the same wages paid to the white men, would not the white men refuse to work with such a contractor? Now, I wish to tell you, not what I read about or heard somebody else tell about, but what occurred on my own premises. All our buildings were burnt about two years ago. We employed a white contractor to rebuild them. White men and colored men, carpenters, bricklayers, painters, and common laborers, worked together in the greatest harmony, at the same wages for the same kind of work. This could hardly have occurred in New England. Colored men got higher wages than white men doing the same work, if the colored men were better workmen. This could hardly have occurred in Michigan or Wisconsin. And what may seem

stranger still to you northern people, with your strong race prejudices, colored men and white men, with wages graded by skill, not by race, worked in perfect harmony together under our contractor's negro foreman or "boss carpenter," a thing which could hardly have occurred in any Northern State.[1]

But this duality, indistinct as it is in some lines of activity in the South, is in other lines as distinct as the land is from the sea. The "hitherto shalt thou come, but no farther," is as distinct in the minds of the two races as the color is in their faces. And it is very expensive educationally. The decision is simply between two schools for a community or no school. There is no middle ground. And not only so, but the white people, who are so impoverished as not to be able to sustain respectable public schools for their own children, have taxed themselves of their own accord to sustain schools for the blacks.

The white people of North Carolina, as I have already said, pay ninety-nine hundredths of the taxes, and three-sevenths of the money raised goes to sustain the public schools for the blacks; and, besides this, we have, of our own accord, established separate normal schools to teach their teachers; we have, of our own accord, established a separate deaf and dumb institution for their mutes; and we have, of our own accord, built a costly asylum for their insane; in order to do this we have taxed ourselves up to the highest constitutional limit, and as heavily as Massachusetts taxes herself; and, in consideration of our local option taxes for graded schools and in further consideration of the fact that nearly half of our population pay no taxes, the white people of North Carolina are to-day taxing their dollar twice as hard as the white people of Massachusetts are taxing their dollar for public schools, and yet we can keep our public schools open only three months in the year and can pay the teachers only $25 per month and they board themselves.

In these peculiar straits we cry for help. We could educate our own people with our own means, but we cannot educate our own children even, when three-sevenths of the money raised in North Carolina and a much larger proportion in other Southern States must go to educate the blacks, whom the United States Government armed with the ballot without making any provision for giving them intelligence to use it. Is this just to us? Is it just to the blacks? Is it just to the country at large? As a matter of fact, we of the South are paying the heaviest war tax in proportion to our means which a people ever paid, to educate the children of another race, for whose presence among us we are not responsible, who were thrust into our citizenship without our consent, and for whose education we are doing so much of our own volition that when our own children cry to us for bread we have to give them a stone.

The United States Government, and the United States Government

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[1] For particulars address T. C. Oakley, contractor and builder, Durham, N. C., and Rev. Dr. Mattoon, Charlotte, N. C., who told me that the same thing occurred during the erection of the new building at Biddle Institute.

alone, is equal to the emergency. There is a surplus in the Treasury, and the constitutionality of appropriating such a surplus has already been settled, if precedent can settle it. The Government has in effect endowed agricultural and mechanical colleges in almost every State in the Union with money's worth in public lands. Now, if the Government can give and the States receive money's worth for higher education, it seems idle to object on constitutional grounds that the Government cannot give money for the education of the masses, and especially for the education of the blacks, who will be benefited more than the whites by national aid. And we of the South feel that in previous benefactions by the Government we have not had our share.

According to the American Almanac for 1879 the Northern States have received more than 70,000,000 acres of public lands, which, at $1.25 per acre, the Government price, amounts to $88,000,000, while the South has received only six and a half millions of acres, amounting in round numbers to $8,000,000, a difference of $80,000,000 in favor of the North, who have suffered no calamity, who have had no mass of illiterates added to their citizenship, whose prosperity has been uninterrupted, and whose illiteracy prevails only among an inappreciable proportion of the population.

Some who favor the distribution of the surplus among the States say that the distribution ought to be made according to population and not upon the basis of illiteracy. Does not this objection seem futile to any reasonable man? In time of danger the army goes to the threatened point; the navy goes to the threatened point. When an epidemic prevails the aid goes to the threatened point. Illiteracy is the point of extreme danger; and should not the aid be sent to the place where it is needed, on the same principle which regulates the movements of the army or the navy or of aid when epidemic or flood comes?

Some say that the States cannot be trusted with the distribution of the money. But the States have been trusted with the distribution of the proceeds of the public lands, and why not with a cash surplus? Every Southern State has a system of public instruction in successful operation, and no misappropriation of funds has occurred in any part of the South since the carpet-baggers were driven out. Some say that the colored people will not get their share; but they get their share now of all public moneys raised by taxation, though the whites pay ninety-nine-hundredths of the taxes; and if we give them their per capita share of money, wrung from the impoverished white people by taxation carried by our own volition to the utmost limit allowed by the constitution, we may surely be trusted to give them their share of money given by the Government, more for their benefit than for ours, and more their due than ours, under all the circumstances.

Some say that the South has contributed but little to the National Treasury, and so has but little right to call for national aid. But in 1881, according to the Report of the Commissioner of Internal Revenue,

North Carolina paid in direct taxes $2,479,362, and Massachusetts $2,699,680, only $200,000 more, with 300,000 more people and with ten times the taxable property. And North Carolina pays nearly twice as much as all New England, excluding Massachusetts, the figures being for North Carolina, in round numbers, $2,400,000, and for all New England, excluding Massachusetts, $1,400,000. And while North Carolina pays nearly as much internal revenue yearly as Massachusetts and $1,000,000 more than all New England, excluding Massachusetts, with only one-tenth of the taxable property per capita, the difference is still more marked between North Carolina and Kansas. With a population a little greater than Kansas, North Carolina probably consumes as many goods which pay a tariff as Kansas, while North Carolina pays ten times as much internal revenue as Kansas, the figures being for North Carolina $2,400,000 and for Kansas $240,000 yearly, in round numbers, and we pay at the same time a very heavy voluntary tax for the gratuitous education of the wards of the nation, and are so strained to do it that our own children are neglected and are growing up in illiteracy around us.

But there are some limitations which we think ought to be made. The aid ought to be limited to communities who do something for themselves. Any system of relief which pauperizes those relieved is a curse in the guise of a blessing, a veritable wolf in sheep's clothing, a devil as an angel of light. Require each community to put down a dollar of their own and "cover" it with a dollar, or two dollars, or more if need be, from the national aid fund; but do nothing till the community which you intend to aid has done all it can for itself.

There is another limitation which it seems to me ought to be insisted upon. Do not allow any of the national aid to be put into buildings. We do not want one dollar of it put into bricks: we want it all put into brains. I believe that the greatest mistake which has been made educationally, North and South, has been in applying endowments to bricks instead of brains. There are literally hundreds of communities in the South who determined to drive out the devil of ignorance; and so they made a grand effort, got a long subscription list and put a large sum of money into a showy school building, without providing a dollar to pay teachers; and for a while they enjoyed the vain delusion that a school-house is a school. But the devil of ignorance, like the unclean spirit that went out of the man in the parable, after walking through dry places seeking rest, findeth none, and he saith, I will return to my house whence I came out, and he findeth it "empty," it is true, but neither "swept" nor "garnished;" and so he goeth and taketh to himself seven other devils worse than himself: the devil of discontent, the devil of disappointment, the devil of misappropriated funds, and in a sort of "stump speech" like this you will pardon me for using a word of slang and adding the devil of "general cussedness;" and the last state of that community is worse than the first. In order to emphasize this objection to

endowing bricks instead of brains, I call your attention to the fact that at the first great reformation, the formation of christianity in fact, our Lord and his immediate followers, the reforming and reformed element, left all the buildings and other church property in the hands of the unreformed element and preached from house to house, in highway, field, and wilderness. In the second great reformation, Luther and his followers imitated the example of our Lord and his followers, and the church buildings and property were left a second time by the reform in the possession of the unreformed. The same thing occurred again in the Wesleyan movement. The same thing occurred again in the free church movement in Scotland in 1837. I tell you, if you endow teacherships, if you put a good teacher to work, a house will crystallize around him, good enough for all practical purposes; and, as a practical proof of this, I call your attention to the encouraging fact that in 1882 the public school property in North Carolina, backward as we are in many things, was worth twice as much as it was in 1881, according to the report of the superintendent of public instruction; and by the end of 1884 it is safe to say that it will be worth twice as much as it was in 1882. A snail builds his own house; an oyster secretes his shell from his own substance; and if a school cannot do as well as a snail or an oyster, we had better give up the business of public education.

Another limitation should be, it seems to me, that not a dollar should be paid in salaries to officials. We do not want any more revenue officers. The States have administered the proceeds of the land scrip, amounting to nearly $100,000,000, for higher education, and the States can surely administer a smaller sum for the education of the masses. The educational machinery of every State and of every county in every State is in running order, and is running at half speed in the South for want of motive power. Put in the motive power in the shape of teachers' salaries, so as to increase the duration of the schools from three to six months, and raise the teachers' salaries from $25 to $50 per month, and the results would be marvellous.

Another limitation should be made in regard to time. The aid, if given, ought to be temporary, so that our people may be stimulated to their utmost while the aid lasts, and thus they will not be emasculated by depending upon external aid for internal needs.

The need is the result of entirely anomalous conditions: the terrible prostration of the white people, and their consequent inability to educate their own children, and the presence of six million illiterate blacks armed with the ballot which they cannot read. These conditions make a crisis of momentous import, and neither whites nor blacks have, as yet, any accumulated resources, but must draw upon the future, year by year, by mortgaging the growing crop in order to get supplies to make it with. But the worst is passed. Our people are aroused. The new education is abroad among us. The teachers of our common

schools are visiting the Northeast and the Northwest in search of the best methods of instruction. Experts from the Northeast and Northwest have come in large numbers to preside over our normal schools and teachers' institutes in various parts of the South, and many of our native teachers are doing work of this kind in a way which would do them credit in any part of the Union.

The graded school movement, to which I have referred incidentally, has given a wonderful impulse to public education. These schools are established in almost every town of any considerable size, the proceeds of the regular school tax being supplemented by a local option tax, which supplies money enough to keep the schools in operation for nine months. The germ of this the most important educational movement among us is the Tileston Normal School, established in Wilmington, N. C., by Miss Bradley almost immediately after the war, and sustained by the munificence of Mrs. Hemenway, of Boston. I doubt whether the same amount of money ever produced as great results, educationally, before. The success of Miss Bradley and her female colleagues convinced our people of two things which they had not realized before: (1) that a public school could be made worthy of the patronage of our best people and (2) that female teachers could do it. And now there are many of these "graded schools," presided over by a male superintendent as a rule, but taught almost exclusively by female teachers, and doing as good work, in the opinion of such a man as Dr. Mayo, of the New England Journal of Education, as any schools in the United States. Under all these circumstances, "the set time to favor Zion" has come.

With national aid for ten years, we can manage illiteracy, both of blacks and whites, ourselves; but, if we continue the unequal struggle for these most germinant ten years without the support which we are in a condition to use with the greatest effect now, our people will be discouraged, and there is danger that a darkness that will, sooner or later, make itself felt will envelope a people who only need temporary aid to put them where they can and will provide for themselves.

And the poverty of our people will, in one respect at least, give momentum to this great educational movement; for nowhere in the civilized world can the same class of teachers be commanded for as little money. In other countries the most cultured people, those who lead public sentiment, those who stand highest socially, cannot be induced, in any considerable numbers, to undertake the laborious business of teaching; but in the South hundreds of cultured men and thousands of cultured women are reduced to such pecuniary straits that they are ready to do any respectable work which will yield them even the scanty pay which taxation and national aid combined will give to a public school teacher. This is especially the case with our women. There are very few avenues of employment open to them, and the pay they can earn is very small; but they are looking, as never before, for some honorable means of becoming self supporting. I have been calling the attention

of our people for several years to the fact that so many teachers at the North and so few teachers at the South are women. Two years ago seven-eighths of all the teachers in public schools in Massachusetts were women, while only one-seventh in North Carolina, as a whole, were women, though in "graded schools," taken alone, fully six-sevenths of the teachers are women, which accounts for their excellent work for children and their comparatively small cost; and the Tileston Academy at Wilmington, already referred to, was, I think, the first school of the kind in a Southern State. We want to organize and utilize the God-given skill and earnestness of our women in the management of our school children in the *country schools*, where twenty-two-twenty-thirds of the children must be trained if trained at all; also, as has been done already, in the towns; and teaching children is a business in which the fingers of most men are all thumbs, the thumbs all elbows, and the elbows are cut off at the shoulder joint. If we had teacherships paying $500 a year, the best and most cultured women in the South could be commanded to do the work of public instruction in the country schools, as they are already doing it in the graded schools in the towns, and this is the only hope for the twenty-two-twenty-thirds of our population, for only one-twenty-third live in towns; and it is only when native teachers take hold of the work in any community that it can be made permanently successful. In order to prepare this large body of prospective teachers to be most efficient, normal training by experts should be provided for from the national aid fund. Many of these prospective teachers, especially among our young women, are already well equipped as far as a knowledge of subjects is concerned. Brains, intelligence, and enthusiasm can be commanded, and these will make vastly better teachers without any special normal training than all the normal training of all the normal schools, without brains, intelligence, and enthusiasm. But if, in addition to these indispensable requisites, special normal training, or training in the best methods, can be given, the best results will be attained. But these prospective teachers are poor and cannot pay for this normal training. Schools of repute among us could probably do the work in part, at least, with most effect and at the least expense; but they are already so overburdened with the regular instruction of non-paying pupils that they cannot establish efficient normal classes for the special instruction of non-paying teachers. The States can do no more than they are doing in the way of summer institutes, lasting only four or five weeks; and, unless continuous normal training is given from the national aid fund in points numerous enough to be reached at small cost and without tuition fees, national aid will lose fully one-third of its value, and probably half of its value, for lack of teachers to administer it who know methods as well as subjects.

Such colored men and women as General Armstrong, at Hampton.

has inspired with the spirit of the Almighty God should be enabled to train their own race, and, if the pay were sufficient, by degrees our white people who, in many localities, have labored for years in the religious training of the colored people in Sunday schools, &c., would become interested in their public school work, and such schools, like mission schools in heathen lands, without disturbing the social relations of teachers and taught, would do much to secure harmony and to cultivate kindliness between the races.

As a proof of the personal interest which our best people are now taking in the colored schools, I beg you to note the fact, already referred to, that in as many as three of our largest towns in North Carolina the graded schools for both races are managed by the same white superintendent, and the additional facts that our most prominent physicians are instructing a class of colored medical students in Shaw University, Raleigh, N. C., and that the son of a prominent clergyman and doctor of divinity of the Southern Presbyterian Church has been giving instruction to colored men in Biddle Institute, Charlotte, N. C., and that the principal of one of our most successful private schools, who for seven years has been a teacher in the University Normal School, is to take charge of the Colored Normal School at New Berne in August.[1] How grandly, then, under all these circumstances, can the General Government show the world, by this appropriation, the estimation in which education is held in the Great Republic! How grandly can the General Government indorse the labors of the thousands of hard worked and poorly paid educators, that noble army of martyrs, who do so much for others and so little for themselves! How grandly can the General Government supplement the liberality of benevolent people in the North, who, from their private resources, have given more than $10,000,000, since the surrender, for the education of illiterates in the South!

The war between the States is one of the grandest dramas of all the ages. Its results have been momentous. It advanced the civilization of this country wonderfully. We are to-day a century ahead of what we would have been without it. The clash of arms ceased nearly nineteen years ago; but the war will not be really ended till the leprosy of illiteracy is removed from the white people whom the war impoverished and from the blacks whom it enfranchised and armed with the rights of citizenship. What a grand ending of the war forever, what a grand dropping of the curtain upon the grandest drama of the grandest century of all the ages, for the United States Government to make this grand appropriation for education! Let this great act be done. Let the sun of the nineteenth century set in this splendid radiance, making the evening of the century

> One of those ambrosial eves
> A day of tempest sometimes leaves.

[1] For particulars address Dr. Richard H. Lewis, Kinston, N. C.

PROPOSED LEGISLATION RESPECTING NATIONAL AID TO EDUCATION.

Mr. BICKNELL said that the Interstate Educational Convention, composed of delegates appointed by the governors of the respective States, was held at Louisville, Ky., September 19–21, 1883. Twenty States were represented and three days were devoted to the consideration of national aid to education. At the close of the convention a commission was appointed "to memorialize Congress upon this subject and to assist in any manner which their judgment may approve in securing the legislation necessary." The members of the commission are Hon. W. M. Beckner, judge of the superior court, Kentucky; Thomas W. Bicknell, LL. D., editor of the Journal of Education, Massachusetts; Hon. J. L. M. Curry, LL. D., general agent of the Peabody education fund, Virginia; Rev. O. P. Fitzgerald, D. D., editor Methodist Advocate, Tennessee; Hon. John M. Gregory, LL. D., United States Civil Service Commissioner, Illinois; Rev. Atticus G. Haygood, D. D., agent Slater fund, Georgia; Milton S. Lytle, esq., Pennsylvania; Hon. M. A. Newell, LL. D., State superintendent of public instruction, Maryland; Hon. B. G. Northrop, LL. D., ex-secretary State board of education, Connecticut; Hon. Thomas H. Payne, State superintendent of public schools, Tennessee; and Henry Randall Waite, PH. D., statistician in charge of the educational division of the census, New York.

This commission has prepared the following as a suggestive bill, which is not intended to supplement or interfere in any way with any measure now before Congress:

A bill to establish an educational fund to aid in the support of public schools in the several States and Territories.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for twelve years after the passage of this act there shall be apportioned from the money in the Treasury not otherwise appropriated, for each illiterate person[1] between the ages of ten and twenty, inclusive, in the several States of the United States,[2] as shown by the United States census last preceding, and for each person in the several Territories between and including the ages of six and twenty, as shown by the United States census of 1880, the following amounts,[3] to wit:

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[1] Previous bills have proposed a distribution on the basis of the total amount of illiteracy, thus including 4,204,363 persons who have passed the age of twenty years and are therefore beyond the reach of common school instruction. If the provisions for Federal aid are to specifically include only those who may possibly be benefited by its bestowal (which seems just and wise) out of the total of 6,239,958 illiterates ten and over, plans for apportionment will include only those under the age of twenty-one, numbering 2,035,595, as herein provided for.

[2] As the necessities of the Territories are based on the fact that educational needs are in advance of material development rather than excessive illiteracy, and since an apportionment of funds on the basis of illiteracy would secure to most of them a comparatively insignificant sum, it would seem wise that the apportionment therein be made on the basis proposed in lines 8, 9, and 10 of section 1. (See tables, pages 110, 111, and 112, for exhibit of amounts apportioned on each basis.)

[3] It is obviously expedient that the bestowal of aid be so apportioned, year by year,

First, second, and third years, each year, $4; fourth, fifth, and sixth years, each year, $3; seventh, eighth, and ninth years, each year, $2; tenth, eleventh, and twelfth years, each year, $1; at which time appropriations under this act shall cease.

SEC. 2. That to superintend the carrying into effect of the provisions of this act a board of trustees[1] is hereby created, which shall be composed of seven members, to wit: the Secretary of the Interior, ex officio; two members of the United States Senate, and two members of the House of Representatives, not belonging to the same political party, to be appointed at the opening of each Congress by the President of the Senate and the Speaker of the House, respectively, and to serve until their successors are appointed; and, ex officio, the Commissioner of Education and the Fourth Auditor of the Treasury Department.[2]

SEC. 3. That the amount of the fund appropriated by this act for each year shall be paid into the hands of the Secretary of the Interior upon a warrant presented by him to the Secretary of the Treasury certifying the same; and the said sum shall, under his direction, be annually apportioned among the several States and Territories and paid into the hands of the duly authorized officers of such of the same as are certified by the board of trustees to be entitled to receive their apportionment for the said year; and the first apportionment shall be made on or before the first day of July, 1884, and succeeding apportionments on or before the same day in succeeding years; but no State or Territory, after the second appropriation[3] under this act, shall receive under its provisions a greater sum than such State or Territory shall have expended

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as to coincide in amount with the expected increase in the ability of the States to financially provide for their own educational needs.

Two of the most favorably considered of previously proposed enactments have provided for the withdrawal of Federal aid, one upon a final bestowal of $10,000,000 at the end of five years and another upon a final bestowal of $6,000,000 at the end of ten years. The sudden withdrawal of aid to either of the amounts named would require a correspondingly sudden increase in the State revenues in order to prevent the partial collapse of school systems. It is probable that instead of the sudden increase in State revenues thus made necessary, Federal aid would be again sought, and the way thus opened to the perpetuation of grants intended to meet a present and temporary necessity of the character of an emergency.

The plan of apportionment herein provided for contemplates a decrease of Federal aid so graduated as to accord with an increase in State revenues, which may be easily provided year by year until and including the year when Federal aid shall cease. (See tables, pages 110 and 111.)

[1] To meet the evident necessity for a proper supervision of the contemplated expenditure of funds on the part of the National Government, a board of trustees, composed of officers of the Government, who shall act ex officio, would seem the simplest and most effective provision. The creation and payment of new officials, whose special acts might prove a source of mischief, is thus avoided, and the onerous and responsible task which would devolve upon the Commissioner of Education were he alone to be charged with the execution of the provisions of the bill is so divided among existing officials of the highest competency and fitness, including the said Commissioner, as to remove all possibility of the personal criticism which might follow individual acts in themselves just and proper, and which could hardly fail to be received with favor as emanating from a board of the character contemplated.

[2] In view of the important work devolved upon its members and the fact that the pressure of their ordinary duties will make it difficult for any one of them to undertake the added duties of the office, the services of a secretary may be required and could be utilized in the conduct of any inquiries as to the administration of funds in the several States and Territories which may with propriety be instituted or which are provided for in conjunction with State officers by section 9 of this act.

[3] This provision is intended to meet the needs of certain States whose present educational revenues could not well be immediately increased to such an extent as to en-

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during the previous year for purposes of public instruction from moneys raised in said year by State or territorial and local taxation.

SEC. 4. That the funds paid to the several States shall be apportioned and expended by their duly authorized officers among the counties[1] or corresponding divisions of such States in proportion to the number of illiterate persons in the same between the ages of ten and twenty-one, as shown by the United States census last preceding, and shall be applied within the same to the free common school education of children, without distinction of color, between and including the ages of six and twenty, and to the support of schools for the training of teachers, and also for the building of school-houses: *Provided*, That not more than one-third of the income in any one year be applied to these objects, and that the sums apportioned to the several Territories shall be likewise applied to the free and impartial education of children between and including the ages above named, as nearly as may be in accordance with the number of the same in the several counties; and, in States or Territories or portions of the same where separate schools for white and colored children are sustained, the moneys received under this act shall be divided and expended among such schools in proportion to the respective number of white and colored illiterates enumerated therein at the United States census last preceding; and it is understood that under the term "free common school education" may be included such rudimentary instruction in the useful arts and industries[2] as the several State and territorial authorities may see fit to provide for or permit.

SEC. 5. That, to entitle them to receive aid under the terms of this act, the several States and Territories shall comply with the following provisions:

(1) They shall designate the officers to whom shall be paid and by whom will be disbursed the sums annually apportioned under this act.

(2) To secure a just measure of uniformity in the application of this aid, for four months[3] in each year suitable schools must be maintained in each of the counties or corresponding divisions in said States and Territories wherever the parents of forty children of school age, within a radius of 5 miles, demand the same, it being agreed that said children shall attend school in the same place.

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title them to their full apportionment on the basis proposed, but which can, with other States, comply with the conditions named at the end of the second year.

[1] The extension of the method of apportionment to county distribution is recommended for two reasons, both believed to be worthy of recognition: (1) As a guarantee that it will be equally and fairly distributed, it will remove a serious objection to such aid in the minds of those who fear that the funds apportioned, for any reason, may be used for the special benefit of favored localities. (2) It will be a welcome assurance to the people of the several counties that in the distribution they will receive their just allotment of aid, the exact amount of which will be known, thus affording a stable guide for local action from year to year.

The States will have it in their power to prevent local abuses in the use of Federal funds, under the terms of sec. 6.

[2] The wisdom of including, to a proper extent, the useful arts and industries among subjects of instruction in the common schools, in view of the growth of industries and manufactures in many parts of the Union and the desirability of drawing the attention of a larger number of our youth to the fields thus open to them, seems obvious.

[3] It would seem unjust to grant equal aid to States of like resources where schools are taught on the one hand for seven or eight months and on the other for two or three. It would be, at the same time, impolitic, if not offensive, to insist upon any school term to provide for which would seriously embarrass any State. A period has therefore been named which can be easily reached in any State, and which is already far exceeded in the great majority of those most in need of assistance, and which, it is believed, will be acceptable in every State.

(3) State and territorial superintendents or officers of public instruction shall cause to be made to them, and shall transmit to the Commissioner of Education, on or before the first day of October in each year, such reports concerning the condition of the schools in the same as the trustees of this fund shall deem desirable.[1]

SEC. 6. That in any State or Territory in which any county or division shall neglect or refuse to comply with the State or territorial laws made in pursuance of and for the purpose of carrying into effect the terms of this enactment, the duly constituted authorities of said State or Territory may withhold from such county or division its apportioned share of this fund, and may expend the same for the maintenance of schools for the instruction of teachers: *Provided*, That a report of such intended action and such use of funds is immediately made to and receives the approval of the trustees of this fund.[2]

SEC. 7. That if any State or Territory shall fail to comply with the terms of this act the board of trustees may, at their discretion, withhold the certificate that said State or Territory is entitled to receive its apportionment of said fund, and said sum shall be covered into the Treasury.[3]

SEC. 8. That the board of trustees shall certify to the Secretary of the Interior the amounts apportioned to the several States and Territories under the terms of this act and the States or Territories from which such amounts are withheld for any reason, with a report embodying the result of its investigations and labors; and the said report shall be placed in the hands of the Commissioner of Education, to be by him submitted to Congress in connection with the report required of said Commissioner by section 518 of the Revised Statutes; and the board of trustees shall provide for the use of State and territorial officers forms of blanks for the collection of the desired information relating to schools; and, in the States where such officers are at liberty to avail themselves of such privilege, the chief State officers, and, in the Territories, the superintendents of public instruction may act as the duly appointed agents of the trustees for the collection of said educational statistics, but without compensation from the board of trustees or from the Bureau of Education, and may have the free use of the United States mails as such agents and for that purpose.

SEC. 9. That the board of trustees are authorized to conduct such inquiries as shall seem necessary in order to satisfy them that the terms of this act are being complied

[1] The great value of properly collected educational statistics for the information of the whole people, as well as the obvious propriety of gathering information as to the results of such aid as may be bestowed by the National Government, makes the collection of useful statistics relating to public schools, herein provided for, most desirable, if not essential. The value of such statistics depends, however, upon proper uniformity in the character and meaning of questions and answers. The adoption of the provisions here recommended will put it in the power of the Commissioner of Education, with the coöperation which the State school authorities on the terms proposed will gladly render, to collect a body of statistics which shall include information required by the board of trustees and in such form as to adapt it to the uses of his Office and the needs of the general public without necessary interference with the varying statistical methods of the States (a variance which now largely detracts from the value of statistics when arranged in comparative tables). Statistical reports of the common schools in the United States would thus be secured, whose accuracy would make them of inestimable worth in the light which they would give as to the value of educational methods and the progress of popular education.

[2] The effect of the terms of this provision will be to remove, in large degree, any supposed necessity for Federal supervision in the administration of funds, by delegating to the States such authority in the premises as will enable them to secure their just application.

[3] The importance of the possible action here contemplated emphasizes the expediency of constituting a board of trustees of the character provided for in section 2.

with in the several States and Territories: *Provided*, That such inquiries shall be conducted in coöperation with the duly constituted school authorities of the several States.[1]

SEC. 10. That the annual contingent expenses[2] of the board of trustees, including secretarial expenses, shall not exceed ——— dollars and shall be paid out of funds in the Treasury not otherwise appropriated.

The following table, showing amounts distributed to the respective States on the basis of the illiterate population between and including the ages of 10 and 20 and to the respective Territories on the same basis and on the basis of the population between and including the ages of 6 and 20 for a period of twelve years, was prepared for the Interstate Educational Commission by Henry Randall Waite, statistician, Tenth United States Census, in charge of inquiries relating to education, illiteracy, libraries, &c.

States and Territories.	1884, 1885, 1886. Each year $4 per capita.	1887, 1888, 1889. Each year $3 per capita.	1890, 1891, 1892. Each year $2 per capita.	1893, 1894, 1895. Each year $1 per capita.	Total amount in 12 years.
Connecticut	$14, 352	$10, 764	$7, 176	$3, 588	$107, 640
Maine	22, 404	16, 803	11, 202	5, 601	168, 030
Massachusetts	36, 352	27, 264	18, 176	9, 088	272, 640
New Hampshire	14, 108	10, 581	7, 054	3, 527	105, 810
New Jersey	32, 228	24, 171	16, 114	8, 057	241, 710
New York	109, 664	82, 248	54, 832	27, 416	822, 480
Pennsylvania	152, 708	114, 531	76, 354	38, 177	1, 145, 310
Rhode Island	20, 172	15, 129	10, 086	5, 043	151, 290
Vermont	11, 344	8, 508	5, 672	2, 836	85, 080
Total each year New England and Middle States on basis of illiteracy	413, 332	309, 999	206, 666	103, 333	3, 099, 990
California	34, 820	26, 115	17, 410	8, 705	261, 150
Colorado	11, 936	8, 952	5, 968	2, 984	89, 520
Illinois	142, 576	106, 932	71, 288	35, 644	1, 069, 320
Indiana	99, 516	74, 637	49, 758	24, 879	746, 370
Iowa	35, 344	26, 508	17, 672	8, 836	265, 080
Kansas	43, 532	32, 649	21, 766	10, 883	326, 490
Michigan	46, 696	35, 022	23, 348	11, 674	350, 220
Minnesota	24, 528	18, 396	12, 264	6, 132	183, 960
Nebraska	12, 844	9, 633	6, 422	3, 211	96, 330

[1] While there is serious objection to the creation of Federal supervising officers with power to interfere in State affairs, there is a general recognition of the propriety of Federal oversight in the apportionment and expenditure of funds provided from the National Treasury. Such oversight, it is believed, can be sufficiently exercised by the trustees provided for, acting in conjunction with the State and territorial school authorities, with the aid of a single secretary or agent.

[2] The contingent expenses, aside from amount (if any) paid for secretarial services, would necessarily include a sum sufficient to provide for the expenses attendant upon such conferences, conducted by a single representative of the board with State educational authorities, in accordance with the provision of section 9, as may be found desirable.

States and Territories.	1884, 1885, 1886. Each year $4 per capita.	1887, 1888, 1889. Each year $3 per capita.	1890, 1891, 1892. Each year $2 per capita.	1893, 1894, 1895. Each year $1 per capita.	Total amount in 12 years.
Nevada	$2, 496	$1, 872	$1, 248	$624	$18, 720
Ohio	100, 316	75, 237	50, 158	25, 079	752, 370
Oregon	8, 528	6, 396	4, 264	2, 132	63, 960
Wisconsin	35, 116	26, 337	17, 558	8, 779	263, 370
Total each year Western States on basis of illiteracy	598, 248	448, 686	299, 124	149, 562	4, 486, 860
Alabama	665, 580	499, 185	332, 790	166, 395	4, 991, 850
Arkansas	333, 344	250, 008	166, 672	83, 336	2, 500, 080
Delaware	20, 068	15, 051	10, 034	5, 017	150, 510
Florida	118, 180	88, 635	59, 090	29, 545	886, 350
Georgia	805, 620	604, 215	402, 810	201, 405	6, 042, 150
Kentucky	531, 724	398, 793	265, 862	132, 931	3, 987, 930
Louisiana	419, 112	314, 334	209, 556	104, 778	3, 143, 340
Maryland	135, 904	101, 928	67, 952	33, 976	1, 019, 280
Mississippi	549, 160	411, 870	274, 580	137, 290	4, 118, 700
Missouri	313, 892	235, 419	156, 946	78, 473	2, 354, 190
North Carolina	693, 544	520, 158	346, 772	173, 386	5, 201, 580
South Carolina	541, 800	406, 350	270, 900	135, 450	4, 063, 500
Tennessee	660, 196	495, 147	330, 098	165, 049	4, 951, 470
Texas	517, 952	388, 464	258, 976	129, 488	3, 884, 640
Virginia	580, 032	435 024	290, 016	145, 008	4, 350, 240
West Virginia	129, 998	97, 491	64, 994	32, 497	974, 910
Total each year Southern States on basis of illiteracy	7, 016, 096	5, 262, 072	3, 508, 048	1, 754, 024	52, 620, 720
Arizona	38, 284	28, 713	19, 142	9, 571	287, 130
Dakota	144, 536	108, 402	72, 268	36, 134	1, 084, 020
Idaho	33, 408	25, 056	16, 704	8, 352	250, 560
Montana	31, 260	23, 445	15, 630	7, 815	234, 450
New Mexico	161, 300	120, 975	80, 650	40, 325	1, 209, 750
Utah	208, 736	156, 552	104, 368	52, 184	1, 565, 520
Washington	90, 668	68, 001	45, 334	22, 667	680, 010
Wyoming	18, 056	13, 542	9, 028	4, 514	135, 420
Total each year Territories on basis of population 6 to 20	726, 248	544, 686	363, 124	181, 562	5, 446, 860
Total each year District Columbia on basis of illiteracy	11, 048	8, 286	5, 524	2, 762	82, 860
Grand total each year United States as above [1]	8, 764, 972	6, 573, 729	4, 382, 486	2, 191, 243	65, 737, 290
Arizona	6, 636	4, 977	3, 318	1, 659	49, 770
Dakota	4, 628	3, 471	2, 314	1, 157	34, 710
Idaho	1, 300	975	650	325	9, 750
Montana	1, 620	1, 215	810	405	12, 150
New Mexico	73, 296	54, 972	36, 648	18, 324	549, 720
Utah	11, 692	8, 769	5, 846	2, 923	87, 690
Washington	3, 976	2, 982	1, 988	994	29, 820

[1] Distribution for entire country as per terms of bill, which assumes, as a basis, the illiterate population between and including the ages of 10 and 20 in the States and the District of Columbia and the school population between and including the ages of 6 and 20 in the Territories.

States and Territories.	1884, 1885, 1886. Each year $4 per capita.	1887, 1888, 1889. Each year $3 per capita.	1890, 1891, 1892. Each year $2 per capita.	1893, 1894, 1895. Each year $1 per capita.	Total amount in 12 years.
Wyoming	$508	$381	$254	$127	$3, 810
District Columbia	11, 048	8, 286	5, 524	2, 762	84, 860
Total each year Territories and District Columbia on basis of illiteracy	114, 704	86, 028	57, 352	28, 676[1]	860, 280
States on basis of illiteracy	8, 027, 676	6, 020, 757	4, 013, 838	2, 006, 919[1]	60, 207, 570
Grand total United States on basis of illiteracy[2]	8, 142, 380	6, 106, 785	4, 071, 190	2, 035, 595[1]	61, 067, 850

[1] These numerals correspond with the number of illiterates between the ages of 10 and 21 as shown by census of 1880.

[2] Distribution for entire country on basis of illiterate population 10 to 20 in the Territories as well as in the States and the District of Columbia. It will be seen that the additional sum required by an apportionment on basis of school population (instead of illiterates) in Territories is $4,669,440, or $5,446,860, according to the terms of the bill, as compared with $860,280 on the uniform basis of illiteracy.

The following paper, by Hon. B. G. NORTHROP, LL. D., was submitted, but was not read, owing to the lateness of the hour:

THE NEW BILL FOR NATIONAL AID TO PUBLIC SCHOOLS.

That intelligence is essential to the fit exercise of the elective franchise and that a great peril threatens the nation from the illiterate masses who go to the polls in droves are truths now familiar and almost axiomatic. The objection to "national aid" on the ground of unconstitutionality has been so often answered as to require no consideration here. The able discussion of this subject by the committee of the trustees of the Peabody education fund, consisting of Hon. Alexander H. H. Stuart, Chief Justice Waite, and Hon. William M. Evarts, which was carefully revised by the Chief Justice and unanimously approved by that committee and afterwards by the entire board of trustees at their meeting four years ago, and reaffirmed at their last meeting, with a resolution for its re-presentation to all the members of both houses of Congress, gives the semblance, at least, of a judicial verdict in favor of the constitutionality of this measure. Gratifying as has been the work of the Peabody trustees through their agent and wise benefactions in revolutionizing school laws and public sentiment, these grand results are but a mere beginning, a drop in the bucket. The desolation and destitution created by the war still abound. The South cannot at present bear the requisite burden of school taxation. Though now poor, she will soon be rich. Her yet undeveloped resources, agricultural, mineral, and commercial, are immense. Her manufacturing schemes, now just starting, are sure to expand into vast and successful enterprises, favored as they are by such rare natural advantages. An era of unexampled prosperity is near at hand. In a dozen years the South will be able and willing to support her own schools.

The new bill presented by Senator Blair December 5 and that recom-

mended by the Interstate Educational Commission, appointed by the late Louisville convention, agree in recommending an immediate appropriation from the United States Treasury. The plan of aiding schools by the interest of a fund to be gradually accumulated from the sale of public lands is now practically abandoned. The average school age is very short. Many generations of children must pass that brief period before the interest of such a fund, distributed over many States, could yield any appreciable aid. The danger is so great as to demand the earliest possible application of the remedy. Let good schools be maintained for a dozen years by national aid, and they will then be continued without such help. Their results will convert opponents to friends. No instance of the abandonment of free schools, after they have been fairly tried, ever occurred in any free government. Having once experienced their advantages, the people will always maintain them.

The bill of the Interstate Educational Commission was drawn up simply to assist in securing the necessary legislation. The essential thing is to secure some bill at the earliest practicable day. Now that the most essential feature indorsed by the Louisville convention and incorporated in our bill is adopted in the amended report lately presented to the Senate by the Committee on Education and Labor, we would modestly urge the other special features of our bill, for we should be highly gratified by the passage of the bill of Senator Blair as now amended.

Our bill would provide a fund in round numbers of $66,000,000, to be distributed in twelve years on a graduated scale and upon the basis of the number of illiterates between the ages of ten and twenty, inclusive, as most likely to benefit those who would be affected by its bestowal. It provides, on the part of the National Government, a board of trustees composed of officers of the Government, of the highest fitness, who shall ex officio supervise these expenditures. The propriety of such Federal oversight in the apportionment and expenditure of these funds is conceded on all hands. As a great increase of local taxation could not be expected at the outset, Senator Blair's bill wisely provides that the several States and Territories shall each be required to expend annually from local taxation at least one-third the amount received from the Government for the first five years, and after that an amount equal to the sum thus received.

An important feature of the bill presented by the Interstate Educational Commission is expressed in the proviso requiring "that such aid shall be distributed under State laws and by State authorities exclusively, but with proper guarantees for its faithful application." This principle was included in the resolutions adopted by this body at its annual meeting in Washington one year ago. When I drew up those resolutions this was the only point on which earnest dissent was then expressed. In the committee on resolutions, at Louisville, objections to

this point were so strongly urged that some of us, for the sake of harmony, consented to its omission in the committee's report, because we could bring it before the full convention in the form of an amendment. When offered by Superintendent Holcombe, of Indiana, that amendment awakened earnest and full discussion, which resulted in its final adoption with almost entire unanimity. This principle, therefore, may now be accepted as expressing the general sentiment of the educators of the country.

The harmonizing of differences on this point is one of the most important practical results accomplished by the Louisville convention. This view is confirmed by recent observations and conferences with leading educators in many States, both South and North, and by the broader and more careful survey of the whole southern field by Dr. Curry. The long experience of the trustees of the Peabody fund shows the wisdom and safety of distributing the national appropriation for education by State authorities, who are commended by them as faithful and competent officials. As Senator Blair long advocated the opposite plan, I quote a passage from one of his late speeches, which is highly creditable to his wisdom and sincerity:

> The nation has the right to make the appropriations and expend them directly through the authorities of the States. I am rejoiced to say that the developments of the last few years in those portions of the country where national aid to schools is chiefly required, demonstrate the general, though not universal, determination of the people and of the local powers sacredly and honestly to apply all attainable moneys to the removal of the great curse of illiteracy. Such is my own sense of the exceeding gravity of the situation that I am in favor of any reasonable bill which appropriates the money rather than that no bill be passed. It is not a case which admits of delay nor of long deliberation as to the precise method in which the remedy is to be administered. Money is the specific for the disease, and the main thing is to get the medicine into the patient, the body politic at large. It is not so much matter whether the national doctors or the State doctors or men holding diplomas from both institutions give the dose as that it be taken, and that in allopathic doses. I should prefer that the institution which furnishes the medicine should have something to say in its administration, but this nation is too sick of the deadly diseases which grow out of the all prevailing and increasing ignorance of the common people to justify much delay or haggling over secondary questions.

These sterling sentiments of Senator Blair amply answer the objection to the above proviso, so strongly urged here last year and again at the Louisville convention, viz, that it would alienate the best friends of the bill in Congress, and especially that able and earnest advocate of national aid, the chairman of the Senate Committee on Education and Labor. It is only repeating the sentiments of representative men of the South, as well as the North, to say that the plan of distributing and supervising the proposed fund through officers in each State, nominated by the President and confirmed by the Senate, would defeat the successful working of the bill in the South, if not in the North. It is replied that these proposed Federal officers might be the existing State school superintendents. But that result cannot be guaranteed nor made prob-

able. The appointment of two sets of officers for the same work would invite conflicts and jealousies. Besides, each State claims, and has a right to claim, the undivided allegiance of all its officers. It is a minor objection that the one plan necessitates little or no extra expense, while the other involves cumbrous and costly machinery, even if warranted to work without friction. The confidence expressed by the one would invite conciliation and coöperation, while the distrust which prompts the other would excite local jealousies and prevent harmony and unity of action. The South, now reconstructed and loyal to the General Government in its own true sphere, is still naturally and properly sensitive on the question of Federal dictation, as indeed are many of the Northern States.

It is part of a wise statesmanship to avoid occasions of such conflict and adopt a policy best suited to fraternize the whole people alike South and North. The motto of the Swiss Confederacy, and of the several cantons as well, "All for one and one for all," so universally impressed on the heart of that patriotic people that, though divided by language, race, and religion—Catholic and Protestant—they are still thoroughly united in devotion to their common country, should especially characterize all sections and States of this great nation. Nothing can tend more to this grand result than the interposition of the National Congress to meet this crucial emergency. Hence the wisdom of avoiding needless conditions that may prove offensive to any sections of our country. The elevation and unification of all the various peoples in this nation is the great problem for the statesmen of our country to-day.

The new bill permits the support of separate schools for white and colored children, but requires that the distribution of the appropriation should otherwise be made without distinction of color. One condition to Federal aid, urged by a few delegates at the Louisville convention, demanded mixed schools. It is only since the war that some of the Northern States have passed a law that no person shall be denied admittance to the public schools on account of race or color. Separate schools for colored youth are still maintained in many Northern States. Call it unjust prejudice, if you will, but that sentiment abounds and cannot be legislated out of existence. The natural result of slavery, it has survived that institution in the North for more than a century and cannot be obliterated at once in the South by law. Prejudices are more deeply rooted than opinions. Arguments may change the latter, but the former are unreasoning, if not unreasonable. Social aversions based on race and previous servitude are more likely to be modified by time and conciliation than by coercive legislation. Social affinities or antagonisms, whether the result of moral, intellectual, or physical laws, cannot be created or annulled by civil statutes. National coercion in favor of mixed schools would defeat its proposed end and intensify the race prejudice, if it did not lead to a war of races and opposition to all free schools.

The most plausible objection to national aid is that it would pauperize the people. This objection would be valid against any such fixed and permanent policy, but does not apply to the temporary relief demanded by the present most pressing exigency. The alternative now in the South is national help or no system of universal education.

The practical limit of taxation for schools has been already nearly reached. The nation must help lift the burden, for the Southern States cannot now bear it alone. Very naturally, in those States where it was formerly unlawful to educate the negro, prejudice and opposition to free schools still exist, though manifestly waning. But the sentiment in their favor is not yet strong enough to prompt the severe taxation needful to educate all classes. The nation alone can rescue the South from the barbarism of ignorance. The South asks this aid, greatly needs it, and now deserves it, for the necessity was created by the war. Congress may help support schools where the destitution which the nation itself has caused makes it impossible for the people, unaided, to maintain them. The funds of the National Treasury are all drawn from the people. A large share of our internal revenue comes from the tax on whiskey and tobacco produced in certain Southern States. Instead of pauperizing them, national aid would be simply returning their share of moneys paid the General Government.

But it is still objected that national aid would lessen local interest in schools, as men value little what costs them nothing. I reply that, in spite of all the nation may do, each State, county, and township must still pay its fair share for the support of this central interest. The very fact of congressional aid would elevate and dignify the school in the estimate of the people, and especially of the colored population. It would everywhere in the South lengthen school terms and lead to the erection of better school-houses. The new interest in public schools in the South is one of the most hopeful signs of the times, for their usefulness and efficiency in any community must depend upon local sympathy and coöperation. Opponents of free schools are still found in the South. This was to be expected. How not to do it, is with them the problem. They deny the wisdom and necessity of universal education.

Such was the experience of England in 1870, when her new school system was introduced. Large numbers of the landholders and aristocracy frowned upon the plebeian plan of educating the rich and poor alike, saying "Such schools will make the common people discontented with their lot. The masses must be laborers. Providence meant them to be hewers of wood and drawers of water. Instead of the drudges which they are designed to be, you make them drones, fit for nothing, a dissatisfied and dangerous class." But, despite such croakings, the English government has carried out an admirable system of universal education, and the happy results in the diminution of pauperism and crime already exceed the expectations of its friends. So will it be in the

South. The gratifying fact is that such views, though ably advocated and disguised in milder phrase, have met so feeble a response in the South.

In all parts of the country are found a few men of wealth who complain of the injustice of being taxed for the education of the children of others. But these taxes are founded primarily, not on the idea of benefiting children and parents, but on the broader view that the State has a proprietary interest in all persons and property within its bounds. The nation that claims a right to its citizens for its defence has duties as well as rights, and one of these is the duty of defending itself by a civilizing education against what would otherwise become a dangerous class in society. The General Government maintains armies and navies for its protection. But better than forts and fleets, better for its peace and protection, is that universal education which is the supreme guarantee of our liberties, the condition of our prosperity, and the safeguard of our institutions.

Mr. Northrop asked that Dr. Curry be invited to address the meeting in his place.

Dr. CURRY, being then called for, reluctantly stepped forward and said: It is well, I think, that the convention of superintendents has emphasized this subject by giving a whole night to its consideration, for I am thoroughly satisfied that there is no subject of a political character requiring legislation which is more important than that which has been submitted to your consideration to-night. It helps a man very much when he has a speech to make to have at least some intimation of the sentiments of those to whom he speaks, and as there is a rule, or used to be a rule, to vote early and often, I believe I will take the vote of this assembly. All those who are in favor of Federal aid to public schools will please manifest it by saying "ay."

Every voice in the hall seemed to respond, and the speaker added, "It is unanimous, and there is no need of a speech on the subject," and took his seat.

Mr. WILSON, from the committee on arrangements, announced the exercises for the next day; Dr. ORR requested the members of the committee on legislation to meet after adjournment; and the meeting then adjourned.

THIRD SESSION—THURSDAY MORNING.

WASHINGTON, *February* 14, 1884.

The meeting having been called to order, Prof. JOHN M. ORDWAY, of the Massachusetts Institute of Technology, submitted the following paper:

INDUSTRIAL EDUCATION.

In a necessarily hurried vacation trip through Europe, made for the purpose of seeing something of the state of industrial education, it was

not possible, of course, to make a thorough study of many schools. But actual inspection of some enables one to understand the printed statements and official accounts which can be gathered up, and to get "oriented" with regard to the terms used in naming and describing the schools. Many designations are about as misleading as the names of our own present political parties, and among the rest the terms "industrial schools" and "industrial education" have become altogether too general and indefinite to convey of themselves any correct idea of what any writer means by them.

Two hundred and fifty years ago most of the physical sciences were in their credulous infancy, and the work of the schools had been altogether in the line of humanistic studies. Then Comenius, in his writings, emphasized the advantage of cultivating Sachunterricht, the study of things, side by side with the Sprachunterricht, the study of words; and thus this Moravian teacher started the wedge which was, at length, to bifurcate the educational system. Utilitarian ideas gained strength, and in time brought about the institution of realschools. It is said that the term realschool, as distinguished from verbal school, was first employed by Christoph Semler, who, in 1706, used a variety of objects, 63 in number, in giving instruction to boys by object lessons. But the first realschool corresponding to those of the present day was begun by Julius Hecker in Berlin in 1746. The well meant, but not always well directed, aim of such schools was and still is to cultivate the pupil in those subjects which should be of practical use in afterlife. By the extension of the realistic idea there have come into existence the Realgymnasien, the polytechnic schools, the Gewerbe or trade schools, the Kunstgewerbe-Schulen or art trade schools, the agricultural schools, the forestry schools, the commercial schools, the realschools, the Industrie-Schulen, the Kreisrealschulen, and the Fortbildungs or continuation schools for those who are past the common school age, and apprenticeship schools, as well as special technical schools of weaving, watchmaking, pottery, horseshoeing, &c. Such schools are supposed to afford a suitable education for those who are to attend to the industries of the world, either as laboring workmen or directors of work. On a closer examination of these educational institutions, as they have been managed hitherto, it is somewhat disappointing to find that in most of them everywhere the methods are still the same as in the humanistic schools: the pupils are made to study not nature itself, not things, not the practical part of the trades, but precedents and authorities, the theories and opinions and observations of others. The work is still, after all, the study of words and, to too great an extent, the cultivation of memory more than of perception and reason. Actual handwork, actual seeing and handling of things spoken of, too often find no place in the curriculum.

Healthy growth of body and development of muscle come not from food alone. There must be light and air and active exercise. So, for a sound

education, something more than the receptive faculties must be attended to. In studying the sciences and the arts an indispensable auxiliary is laboratory work—laboratory work in chemistry, in physics, in mechanics, in anatomy, in biology—field work in natural history and engineering, and handwork in technology. Only in a world of incorporeal spirits can the training and use of the bodily senses be rightly dispensed with. With an ever-growing conviction that the road to true knowledge lies through the laboratory, I look on those schools as really industrial in which the hands and the head work together, and my search abroad was for representative schools of that kind.

In nearly all the realistic schools of Europe, of whatever name or grade, drawing is taught and in some modelling in clay is added. Art schools and Kunstgewerbe schools are numerous, and the art side of education receives its full share of attention. But drawing and modelling, important as they are, constitute but one phase of handwork instruction, and the schools ought not to rest contented with these alone.

In the science courses for teachers at South Kensington handwork comes in in the construction of simple physical apparatus, the elementary parts having been prepared beforehand. This plan is good as far as it goes and is well worthy of adoption among us, but it would be better to begin a little nearer the raw materials. With this exception, handwork in schools and handwork schools seem to have made little progress in England. But there has been much agitation of the subject, and at length the City and Guilds of London Technical Institute has been established and is getting ready to do something in the matter. Already the Clothworkers' Company of the City of London has endowed departments of textile industries and dyeing in Yorkshire College at Leeds, and practical lessons are there given in weaving and dyeing. The Polytechnic Young Men's Christian Association, 309 Regent street, London, advertised evening schools for workingmen in the winter of 1882–'83, in which one or two courses were to be of the laboratory kind, though most were to consist of lectures only. As our British brethren, through the parliamentary commission and otherwise, are studying earnestly what is being done in other countries, it is to be hoped that they will come by and by to see that education should not hinge entirely on lectures and written examinations. We ourselves shall learn some day that written examinations are far from being a complete test of ability and character: they test the ability to cram.

France has done better, and is already alive to the importance of handwork education. The École municipale d'apprentis on the Boulevard de la Villette in Paris is already pretty well known. The school was opened in 1873. Its object is to instruct those who are to be workmen so that they may be skilled in all parts of their trade; and the three-year course is arranged so as to give a broad, intellectual, and practical foundation. The shop work is the same for all in the first year. In the first and second years there are six hours of shop work

and five hours of class work a day and in the third year eight hours of shop work and three hours of class work. The tuition is free and everything needed for study or work is provided by government, without expense to the pupil. This school has been very successful, and at the time of my visit the quarters were being enlarged, but without interruption to the exercises of the school.

There are said to be other schools of the same kind in Havre, Châlons, Lyons, and other places, but I had not time to visit any outside of Paris. There are special schools of horology at Besançon and Cluses. The French are now preparing for a great extension of handwork in the schools of Paris, both for boys and girls; but it will take time to realize their ideas.

The city and canton of Geneva maintain a large and well furnished school of horology in Geneva. But besides this I heard of no considerable handwork school in Switzerland. There are excellent polytechnic schools at Zürich and Winterthur, but the instruction is theoretic or technological.

At Mulhouse, which now belongs to Germany, there is a special school of industrial chemistry under the management of the Société industrielle de Mulhouse. This is the only institution of the kind that I saw or heard of. The same society has a school of engraving and a weaving school. The tuition in the chemical school is $120 a year.

In the Bavarian Industrial Exposition, held at Nuremberg in 1882, a liberal space was allotted to the work of schools, and thus was afforded a rare chance to see in moderate compass a good illustration of German handwork schools. The official catalogue of the exposition also gave a concise account of the present organization and character of the various grades of schools in which the "real" element is meant to prevail.

The Technische Hochschule at Munich is now the highest Bavarian realistic school. It is intended to train the pupils for the charge of industrial operations, for technical government business, or for teaching in technic schools of the middle grade. It was developed out of the old polytechnic schools of Munich, Nuremberg, and Augsburg. This central school was constituted with a university organization in 1868, and the older polytechnic institutions became subordinate Industrie-Schulen. The central high school had 380 students in 1868–'69. In the winter semester of 1874–'75 there were 1,395. In 1881–'82 the attendance was 910. This institution exhibited matters relating to drawing and graphic representations of the results of tests of the tensile strength of metals, &c., made with their Werder machine, but no proper handwork. This is left to the lower schools.

The four Industrie-Schulen of Munich, Nuremberg, Augsburg, and Kaiserslautern showed systematically arranged shop work in iron and brass, but none in wood. On visiting the Nuremberg Industrie-Schule I found a class at work in the shop, which had appliances for filing, planing, drilling, and turning metals and for cutting screws and gears,

but there was no provision for forging or foundery work or joinery. This is said to be the oldest Lehrwerkstatt in Germany. It became a city institution in 1823. The course of study lasts two years. The pupils in all the Industrie-Schulen of Bavaria amounted to 309 in 1881–'82. In the Nuremberg school, of the 94 regular students 40 were in the mechanic-technical division, 18 in the chemic-technical, and 36 in the building-technical. When we compare the 309, of whom only those in the mechanic-technical division take shop work, with the 910 in the central high school, which is technological, we see that education which includes actual handwork attracts by no means the majority of German youth.

But there is some shop instruction in the lower schools. There are Baugewerkschulen — schools for builders — and Kreisbaugewerkschulen at Würzburg, Regensburg, Nuremberg, and Kaiserslautern, and that of Würzburg exhibited specimens of work in iron and that of Nuremberg work in iron, wood, and stone. There is also a Lehrwerkstatt connected with the Palatinate Gewerbemuseum, which showed handwork in iron, wood, and plaster. The Nuremberg Gewerbemuseum has also a shop for foundry work and one for galvanoplastics.

The Kunstgewerbeschulen (art trade work schools) are devoted principally to drawing and modelling and designing. That of Munich has a ladies' division, which exhibited wood carving, block cutting, lithography, decorated pottery, and embroidery. The male division showed wood carvings and paintings on glass.

The Realgymnasien, of which there are two in Bavaria, are merely technological. But of the forty-six Real- or Gewerbeschulen one or two have workshops. There is also handwork in a few of the 300 Fortbildungsschulen.

The Gewerbliche Fachschulen are for special trade work. Of such, the weaving schools at Lambrecht and Münchberg, the pottery school in Landshut, the carving schools in Partenkirchen, Berchtesgaden, Roding, and Bischofsheim, the basket making school at Schaidt, the violin making school at Mittenwald, and the horseshoeing school at Würzburg were all represented in the Nuremberg Exposition.

There were also exhibited from the Frauenarbeitschulen at Speyer, Munich, and Nuremberg work in plain sewing, machine sewing, cutting out, embroidery, and knitting.

Of the numerous weaving schools in Europe, I visited those at Chemnitz and Crefeld. This latter was just moving into a commodious new building and was about to enlarge its scope so as to take in other matters relating to textile fabrics. It has a very rich collection of the woven goods of all ages, from the tenth century to the eighteenth. The course of instruction lasts two years and the pupils must have previously finished the studies of the elementary schools and come to the age of fourteen.

Belgium is said to have 59 schools of textile industry, in which there

were 1,412 pupils in 1877; but, for want of time, I was obliged to pass by Belgium and Austria.

Holland has excellent handwork schools, or Ambachtsschoole, in ten of its principal cities. That of Amsterdam was begun in 1861. At the time of my visit there were 100 pupils in the school. The forenoon, from 9 to 1, is occupied with class room studies, and from 3 to 7 the students work at carpentry, cabinet making, painting, stone cutting, smith's work, or metal turning.

The Rotterdam school was started in 1869. I found there 148 pupils, mostly between twelve and fifteen years of age. The hours from 7 to 11.30 are devoted to school room exercises and the shop work lasts from 2 to 7.30 in summer and from 2 to 5.30 in winter. The work done is mostly for actual use, and articles are made for schools, asylums, and the like.

The Ambachtsschoole of Amsterdam and Rotterdam made exhibits of drawings and shop work in our Centennial Exposition at Philadelphia.

In Denmark, slöjd schools, or simple handwork schools, were started in 1866 by Clauson von Kaas, and a few years ago there were many of them in different parts of the country. But latterly handwork schools have declined in Denmark, and I found that there were only two in Copenhagen, one of which I went to during the noon hour. There was one room of moderate size for wood work and basket making and another for work in pasteboard.

For three or four years past Clauson von Kaas has been laboring in Germany to promote handwork education, and schools according to his plan have been tried at Berlin, Leipzig, and other places. I lighted on a similar school in Strassburg, conducted by Peter Fischer, who teaches drawing in the public schools in the daytime and gives this slöjd instruction to boys twelve or thirteen years old in the evening. Herr Fischer is enthusiastic in his work and the boys appeared to be earnestly and happily employed.

In the last ten years slöjd schools have started into vigorous life in Sweden and have spread with wonderful rapidity. A writer in the Veckoblad för Volkundervisnigen of December 12, 1883, says that there are now very nearly 600. Some are for children of the school age and some for adults. Many are united with the public schools, so that handwork and headwork are carried on under the same management. And it is generally found that when four or six hours a week are devoted to handwork the other studies suffer no detriment, but are pursued with all the greater zeal.

In some of the schools, as in those of Göteborg, there are many branches of work, as bookbinding, carpentry, wood turning, forging, tin plate working, basket making, and leather work, and some choice of work is allowed to the pupils. But the Nääs system of working in wood only, and with a moderate range of choice as to the articles to be made, seems to be gaining in favor. The fundamental idea of the Nääs

school is not work for the sake of the particular work or for pecuniary profit, but handwork for its educational advantages. In Finland, handwork has been constituted by law a part of the school system, but in Sweden it is mostly optional as yet.

Till the last year or two the other countries of Europe seem to have known very little of the great educational movement going on in Sweden. Arriving in Stockholm with no previous information respecting the matter, I was delightfully surprised to find how much the Swedes had done towards the true solution of the great problem of industrial education. They have shown how schools may be made really "real;" for it is plain that children who are instructed under such a system in the lower schools will come to the higher with a far better fitting and with a much greater power of appreciating and assimilating scientific studies. But to make the method fully effective there must be a race of teachers who have themselves been trained in handwork. Teachers brought up in the older system have one-sided sympathies: they are not fit to bring about a proper coördination of headwork and handwork in the schools. It is very hard for men whose minds have run for years in a narrow track to adapt themselves to a broader gauge. And yet such an adaptation is possible. The Slöjd Teachers' Seminary, at Nääs, in Sweden, cannot keep up with the demand for teachers in the new system, and, to provide for the rapidly spreading introduction of the slöjd element into the common schools, teachers' institutes are held for six weeks in the summer, to give the ordinary school teachers a chance to learn wood working so far that they can give instruction in handwork in addition to their other teaching.

Thus we see that, to provide for the realistic education, the European countries have:

(1) Technological schools, sometimes, but with little propriety, designated polytechnic schools, or Gewerbeschulen — that is, trade schools, in which the instruction is itself theoretical though relating to practical subjects.

(2) Special technical schools devoted to real trade instruction, such as the watchmaking school at Geneva, the weaving school at Crefeld, and the pottery school at Landshut.

(3) General artisan schools, in which general study and handwork are pursued together, with broad reference to industrial pursuits. Such are the Industrie-Schulen at Nuremberg, the apprentice schools of France, the Ambachtsschoole of Holland, the mechanic arts school at Kommotau in Bohemia, the Imperial Technic School at Moscow, and the schools of agriculture and forestry.

(4) Independent slöjd schools, or Handarbeitsschulen, in which handwork alone is taught with reference to training the hands for any work and to forming habits of industry.

(5) The Finnish and Swedish union of the slöjd school with the com-

mon school, the true object being to develop all the powers, bodily as well as mental, during the formative period of life.

(6) Industrial museums, as those of Edinburgh, South Kensington, Turin, Nuremberg, and Dresden, as well as the Conservatoire des arts et métiers in Paris. These, and some others which I did not see, are maintained not for mere show but for educational effect. The one at Edinburgh and the one arranged by Cav. G. Jervis, in Turin, are specially noteworthy.

The technological schools, as they are now conducted, are defective in that, though they teach realistic subjects, they still follow too closely the methods of the old humanistic Gymnasien and universities; there is too much dependence on memory; there is too much instruction in the opinions and knowledge of other men, without the actual handling and trying of the things themselves. There are magnificent laboratories of chemistry and physics and biology, but they are rather for specialists than for the mass of students. Before these schools can fully accomplish their object of preparing thinking, observing, investigating men for places in actual life, they must have a greater amount and a greater variety of laboratory work for all or they must receive only those who have already had a thorough training in handwork in the lower schools. They may perhaps continue to build as at present, after they are furnished with a suitable foundation to build on.

The special technical schools are very important and useful, but they concern most those who are connected with the conducting and promotion of the respective industries. It seems proper that such schools should be established and maintained by guilds or associations of craftsmen, and not by the state or municipality.

But the schools which have studies and handwork of a more general character and are therefore suitable for giving a good groundwork for any trade, the Ambachts, artisan, mechanic arts, and apprentice schools, may well be multiplied largely and receive government aid and direction, since they are for the common good and not for a single narrow portion of the industrial class. Yet, it cannot be denied that the original idea of the institutions so named was hardly broad enough, and perhaps they still lean a little too much towards the trade side of education.

The simple slöjd schools of the northern countries have also had too much regard to the pecuniary profit of work. To secure favor for a new thing it may be allowable to appeal to the self interest of those who cannot comprehend higher motives, but the leaders in the movement should not rest till more liberal views prevail.

The combination of the slöjd school with the common school, such as has been brought about in Finland and Sweden, is founded on the idea of the value of handwork as an auxiliary to mental development as a means of cultivating the whole man. And the liberal minded promoters of the movement seem to have become the more confirmed in this view

as accumulating experience shows the justness of it. Many industrial or realistic schools have not been in all respects successful, because they have not really aimed high enough. They have been calculated to make specialists rather than fully rounded men. In the actual business of life men become special soon enough. They need no encouragement to narrowness in their school life. The student becomes valuable to himself and the rest of the world just so far as he can turn his acquirements to account. The real object of the school is not to impart knowledge, but to cultivate the ability to acquire and use knowledge. Static knowledge is not power. Men talk of culture, but is that culture which simply prepares the ground and sows abundant seed? What is the seed good for unless it be made to yield, some thirty, some sixty, and some a hundred fold? That is no real culture which does not bring forth abundant fruit to gladden the heart of man or at least abundant flowers to rejoice the eye.

We are all interested in education and, at the same time, in the material progress of our race. And to further both we need to encourage not mere industrial schools or technical schools, but schools, whether humanistic or realistic, in which the manual element has a much larger share than at present. And by "manual" I mean something more than the use of the hand. I would include the eye and all the bodily senses.

The laboratory in all branches is a great auxiliary. Manipulation assimilates knowledge. We have now in our higher institutions laboratories of chemistry and physics and biology, and it is not thought too expensive to provide room and apparatus and material in these branches. Let us also in the common schools, or the ordinary high schools, not deem it an unreasonable thing to call for the laboratory of general handwork, which will not only give a preparation for the more delicate manipulation in the higher branches, but will give the power to do and to direct the work of everyday life, instead of looking on helplessly to see others act.

The agitation respecting industrial education has already gone so far in this country that not a few are ready to start in the matter, if they only knew how. The first step should be in the direction of having a properly trained body of teachers. And as this is for the general good, this business should be undertaken by the States or the nation. The time may come when Congress, instead of simply making a donation of millions to the States to promote education in an indefinite, pointless way, will see fit to provide for the proper use of the moneys already available, by establishing a central industrial university in the national capital; for the subject is one of national importance, and it were far better that the higher authority should take the matter up and investigate it to the fullest extent than that numberless individual communities should lose time and money in separate tentative experiments. Money alone will not build successful schools. Teachers and well digested plans are the first requisites. There are no teachers now; they

must be made. Education in which headwork and handwork go together is the only rational education, the only one which can develop whole men. Such education is the real demand of the age. Let our Government devote fifteen million dollars, or a hundred and fifty millions, to education, but let them see to it that the education is of the right sort. Let them first appropriate two millions for a university to train the men who shall use the money rightly.

PUBLIC INSTRUCTION IN INDUSTRIAL PURSUITS.

Hon. A. P. MARBLE, PH. D., was announced as the next speaker. He said:

In the brief time allotted to this paper it is not possible to treat the subject exhaustively and to introduce the qualifications necessary to a complete expression of one's meaning. I have noticed, also, that we often misunderstand one another in these discussions both from the partial expression of our thoughts and because what is said with reference to one locality does not apply to other schools where the circumstances differ.

In filling in the outlines of this paper, then, I beg you to credit me with common sense; and, in judging of what I may say as to its adaptability to your own locality individually, bear in mind that I write in Worcester, Mass., and make the proper correction in latitude and longitude, as astronomers do in determining the hour of an eclipse.

The subject of industrial education has received much attention the past few years; and it is now unsettled. In Boston and other cities experiments have been tried with great satisfaction to their friends in the direction of furnishing training for pupils of the public schools in manual labor. In the city of Washington an enthusiastic gentleman, Mr. J. M. Wilson, has for some years kept a school where instruction in one or more trades has been given with, as he says, excellent results. I suppose there is no question that he has done much good in that school. This being granted, it should be remarked, however, that it does not follow that such a school ought to be opened in every city. If there is a good thing for one place, there may be a better for another.

In the city of Boston a carpenter shop has been opened in the basement room of the Dwight school. Benches, tools, lumber, and a teacher have been provided, and a few boys, volunteers from the grammar schools, go there a certain number of hours a week and are taught the first steps of the carpenter's trade. Only a small per cent. of the boys in the school receive this instruction. The course of study is printed. It consists first of driving a nail (striking a square blow with the hammer); then, of cutting a board with a saw; then, planing a board (making a square edge); then, of making joints, &c.

It is said that boys who work in this shop a few hours each week do not fall behind the others in scholarship, and all they learn of the trade

is clear gain. So satisfactory has been the experiment thus far that it is to be extended, and an appropriation of $2,500 has been made for the purpose of opening in that city other schools of a similar character. The same interest has also been manifested in other cities—in the city of Cleveland recently; and it is reported that the Massachusetts board of education looks with favor upon these attempts to solve a problem of growing difficulty.

This popular interest in industrial training and the widespread demand for an education in the schools which shall prepare boys and girls to make their way in life, are of comparatively recent growth. The cause is not difficult to see.

Formerly each man worked more by himself and more independently, as a rule, than he now does. The shoemaker cut, crimped, lasted, pegged, and finished the shoe throughout. Now he does only a single part. One man cuts, another trims, another pegs, another finishes. Then he could teach his boy in his own shop. Now, machinery largely does the work of men, every place is crowded, and all there is for a boy to do is either to go to school or be idle. Once the carpenter and the mason built the house entire. Now the house is made in a dozen places, and the capenter and the mason go to the spot and knock the pieces together in a few days. The doors and sash, the stairs, the finish for cornice and window cap, the mantlepiece, the hearthstone, and the chimney cap are all made outside. Samuel J. Tilden's dining room finish for the new house in New York was made in a shop in Worcester.

What is true of shoemaking and carpentry is equally true of other trades. Machinery and the division and subdivision of labor have so revolutionized business that there is, in cities, very little for boys and girls to do and very little opportunity for their parents to teach them the trades by which they themselves earn their living or any other business.

Now, the public schools were not organized for the purpose of teaching boys and girls trades; nor do they assume nor have they ever assumed that they can warrant all pupils to become thrifty and prosperous men of business. All that these schools claim is that a pupil whose wits and intelligence have been sharpened by study is thereby better fitted to learn some business by which he may get a living; not that the school fits him to get a living by teaching him the details of any kind of business. A church or a temperance society in like manner would not take the contract of securing to each of its members the ability to earn his living at once, but to be good and temperate helps in that direction.

If there is anything which schools can do, however, which will the better prepare pupils for the duties of life, this is a good thing for them to undertake, so far as they can without neglecting something more important.

Now, it is, I think, a question whether the best thing for pupils is a

carpenter's shop or some other kind of shop in the basement of the school-house. Only part of the pupils can profit by it. It is expensive. It covers only a small part of the field; for not all would wish to learn any one trade and too many trades in the basement would be confusing. The experiments now being tried in some cities will furnish data from which all may act more intelligently in future. There is no necessity for repeating the experiments indefinitely; there will be no patent on the best plan when it shall have been discovered, and the real inventor will not, probably, get the credit of his discovery, as often happens.

Manual labor schools were organized in various parts of New England about fifty years ago. It was demonstrated, to their own entire satisfaction, by a large number of sanguine people that students might, while at school, work enough to pay their expenses. The arguments to support the theory were as strong, I do not doubt, as those in favor of the industrial annexes to the public schools are to-day. But those manual labor schools are things of the past, monuments of folly. It was my fortune to see the decaying remains of two such schools, one at Kent's Hill, in Maine, where I was once a student, and the other at Worcester, Mass., where I was a teacher. I confidently predict that the child is born who will look with mournful and incredulous eyes upon the crumbling remains of the industrial annexes which some of our friends are so anxious to join to our public schools. I hope they will not involve those schools in the ruins. There is no easier way to popularity than to attach one's self to the industrial school "annex;" it is as easy as sliding down hill and about as uncertain as to the result. I am reminded of a hymn which you may have heard:

> Broad is the road that leads to death,
> And thousands walk together there.

I am not anxious, then, for any shops in the basement of our school-houses.

Another plan for securing some industrial training to accomplish what was formerly done by the apprentice system is to establish separate schools for the purpose. Coördinate with the colleges we have the technical schools. It has been already demonstrated that such schools are more prosperous as distinct institutions than as adjuncts to the colleges. I think it will be admitted that the Lawrence Scientific School at Harvard, the Chandler Scientific School at Dartmouth, and the Sheffield Scientific School in connection with Yale Colege are eclipsed, as technical schools, by the Massachusetts Institute of Technology, the Stevens Institute, Hoboken, the Free Institute at Worcester, the Troy Polytechnic School, and the Rose Polytechnic School at Terre Haute.

It appears to me that what these institutions have done in the grade of college studies—the higher education—might well be attempted in other institutions of lower grade to correspond to the high and the grammar schools, the secondary and the elementary. As the technical schools

flourish better when distinct from the colleges, so these will thrive better disconnected from the public schools, and, as such schools are of an experimental nature, it would be better for them to be established and maintained during the experimental stages by wealthy and benevolent individuals than by the public. Experiments should not be tried on a large scale by the public. The state cannot manage a railroad successfully, and it should not now open public shops.

One of the studies lately introduced into the public schools tends directly to industrial training; it is manual training also; and it is general and not specific in its character, as all school studies ought to be. This study is drawing.

At an exhibition of work by pupils in the public schools of Charlestown, Mass., a few years since, there were some architectural drawings which fell under the eye of a large contractor and builder. He remarked that the boy who had made the drawings had more than half learned the carpenter's trade. The boy could not have learned so much of that trade in an annex carpenter shop. Drawing, then, was a study of general utility to this boy and to all the others in his class, and at the same time it had benefited him in a specific trade more than work in a shop could have done.

At the same exhibition, a design by one of the pupils was seen by the agent of a large factory for making prints; he said that the designer in his mill was a foreigner whose services were worth $10,000 a year and the talent displayed by the pupil gave promise of the ability to do such work. This specific talent in the pupil had been developed by the general training. At the same time other pupils who had no remarkable talent were benefited in a less degree. Such a result cannot come from a specific training, such as learning to strike a square blow with a hammer, for example.

I have a practical recommendation to make on the subject of industrial education, to which the above is introductory. It appears to me that all the good which the shop "annexes" aim at, and vastly more, can be secured in another way without additional cost and with a direct, positive, and very large benefit to the regular school work: the aim, that is, of interesting and informing pupils in industrial pursuits, so that they may the better earn their own living.

One of the most important subjects of study in any school is the English language, and the best way to learn the proper use of the language is to use it intelligently. The first step in such a use of the language is to have something to say. Expression is easy when there are well defined ideas to express. You have only to tap a reservoir that is full and the water flows. It is hard pumping to any purpose from an empty well. Some of the most futile efforts at writing are made by pupils when they try to say some great thing and have nothing to say. I would like to give some chance for pupils to learn, not a little of car-

pentry or shoe-making, but the outline—the outside appearance—of many trades, and then to write about what they have seen and learned. By such familiarity with the business carried on in the town, they not only learn this all important use of language, but, better still, they learn to investigate; and, better than all, they may become familiar with many kinds of industries, and from some knowledge of them all they may be in some measure prepared to select later that occupation in life for which they are best fitted.

The tendency of schools, of books, of study, is largely in the direction of literary pursuits. A boy goes to school, to the high school and to college, it may be, and he thinks of nothing as the practical outcome of it all except the law, the ministry, medicine, school teaching, or journalism. The technical and the scientific schools have in recent years opened the field for new ambitions. I would extend the effects of such schools into the high and the grammar schools and give, if not a scientific, at least a practical tendency to the instruction in these lower schools. Simultaneously with the grammar school studies I would acquaint pupils with the business life which men and women—their fathers and mothers—are engaged in, in the vicinity of the school. I would not have a boy pretend to work in a sham shop. I would conduct him through a real shop, and teach him to investigate it by seeing the business go on, and then by studying about it, just as all investigation is made.

Let the pupils of the highest grammar grade, for example, be divided into squads of six or eight. Let the teacher, or else some trusty pupil, lead the squad. With the approval of the superintendent or the overseer of the factory or shop, previously obtained, let the squad visit the place of business and carefully observe all there is to be seen. So far as it is possible without interference with the work, let each pupil exercise the Yankee privilege of asking questions. From cyclopædias and all other available sources let each of these pupils learn all he can about the business he has inspected; and then, after a few days of reflection, in order that he may digest and assimilate his knowledge, let him write in simple language what he has learned. This is the exercise in language which I have so highly commended above.

It will be noticed that this plan, followed through a series of years, familiarizes all the pupils with a great variety of industries. Each hears what the others have learned; each may pursue the study of some one business or he may learn about several; and, since there are half a dozen of his mates who saw just what he saw, he may contrast their knowledge, as expressed, with his own. From what he hears from the boys of another squad, who have seen and described another industry, he may become interested in that.

Without further description in detail, you will, I trust, catch my idea (the application is various), the idea, that is, of studying many industries instead of practising one industry in a very limited way, by a very few, and at great cost.

By this plan the habit of investigating what is near is formed, the very best exercise in language is secured (and no two things are more important than these), and incidentally all pupils will become familiar with many industries. Their attention will be directed away from merely literary work, and in this way far more will be accomplished in reality for the cause of industrial education than could be secured by millions of money in little shop annexes to school-house basements, strung along from Maine to California and from Florida to Alaska; for by this means we educate the brain instead of the hand, millions of minds instead of a few hundred muscles.

I have the product of an attempt of the kind above described in one of the Worcester schools. As a literary production, one of the essays is better, has more real merit, as the result of one half-day's observation, than it could have had from a month's direct study of grammar and rhetoric.

Mr. H. S. JONES, of Erie, Pa., said that industrial education is as yet a secondary question, and emphatically so in the schools of Erie, although a city largely devoted to manufacturing. It is the same with the pushing, thriving cities of Cleveland, Buffalo, Pittsburgh, Cincinnati, St. Louis, and Chicago. In breadth and depth of importance, the question is, What can be done in order that the children of the masses may not only enter school, but remain long enough to gain an elementary education? The thousands in our schools are young, very young. It is found in Erie that the children in her schools form a sort of social pyramid, broad at the base, with rapidly converging sides. The record of the great cities mentioned is much less satisfactory. And then there are the rag, garbage, and swill "brigades" of town and city, the primary schools for tramps. This festering, parasitic element is fast becoming a social plague. The battle for the education of the many is scarcely begun; victory can be reached only through desperate struggles. Our shops need educated mechanics, not imitative workmen. When we review the vast army of young children marching with quick step away from school advantages and that other growing street army of ignorance and destruction, it is not difficult to see that our towns and cities are not suffering so much from a lack of industrial education as from that which opens the door to it: elementary education.

The meeting then took a recess until 12 M., to enable the members of the Department to call upon the President of the United States and the honorable Secretary of the Interior. At the Interior Department the gentlemen were introduced to Secretary Teller by Hon. B. L. Butcher. In a short speech the Secretary welcomed the superintendents and teachers and expressed cordial sympathy with the objects of the convention. At the Executive Mansion a special reception was accorded

the members. General Eaton introduced Hon. B. L. Butcher, who in turn introduced the gentlemen present to the President. General Eaton in a short address spoke of the superintendents as representing 6,000,000 of people and alluded to the President's experience as a teacher. The President in reply said that the remembrances of the time of his teaching were among the pleasantest recollections of his life. He felt that the greatest help to the administrative functions of the Government comes from the educators of the country and that the permanence of our free institutions depends upon the education of our youth.

FOURTH SESSION—THURSDAY AFTERNOON.

WASHINGTON, *February* 14, 1884.

The members having reassembled, General Eaton called attention to several communications received by the Bureau of Education with reference to the International Health Exhibition at London, the international exchange of educational material, and the formation of a permanent and international council of education, &c. He moved that committees to coöperate with the Bureau with reference to these matters be appointed, and the following gentlemen were subsequently named by the president: International Health Exhibition at London: Messrs. Wilson, of the District of Columbia; Reeves, of West Virginia; MacAlister, of Pennsylvania; Holcombe, of Indiana; and Patterson, of New York. Permanent and International Council of Education: Messrs. Newell, of Maryland; Harris, of Massachusetts; Payne, of Michigan; Brown, of Ohio; and Coward, of South Carolina.

Hon. W. O. ROGERS, of New Orleans, as a representative of the exposition, presented for the consideration of the members the opportunity of exhibiting the condition of education in the United States at the World's Industrial and Cotton Centennial Exposition, to open at New Orleans in December. He was happy to say that the board of management and the director general, being very desirous of having the fullest and most complete exhibition of education, in their program had given special prominence to this portion of the exhibition. The department of education and instruction is intended to cover the entire field from the Kindergarten to the university. In conclusion he submitted the following:

THE WORLD'S INDUSTRIAL AND COTTON CENTENNIAL EXPOSITION, NEW ORLEANS, 1884.

SECRETARY'S OFFICE.

[Extract from the minutes of a regular meeting of the board of management held February 5, 1884.]

Resolved, That the board of management respectfully and urgently invite the convention of superintendents of education, which will assemble at Washington, D. C., February 12, 13, and 14, to hold their next annual meeting at the World's Exposition in New Orleans, and solicit their coöperation in promoting exhibits in the department of education and instruction.

New Orleans, February 9, 1884.

[SEAL.] SAM'L MULLEN, *Secretary*.

General EATON moved that a committee of seven, to include the president of the Department of Superintendence of the National Educational Association, be appointed to coöperate with the Bureau of Education in arranging for a suitable exhibition of education. The resolution was adopted and the following gentlemen were named as this committee: Messrs. Orr, of Georgia; Rogers, of Louisiana; Smart, of Indiana; Armstrong, of Alabama; Gove, of Colorado; Bicknell, of Massachusetts; and Butcher, of West Virginia.

Mr. BICKNELL moved that the Department accept the invitation to hold its next meeting at New Orleans. Carried.

Mr. BROWN, from the committee on the meeting of school officers, submitted the following:

We, the committee on the proposed meeting of school officers in conjunction with the Department of Superintendence of the National Educational Association, at Madison, Wis., July, 1884, beg leave to submit the following:

Resolved, That the school officers of the various States, counties, cities, towns, and villages of the Union be invited to attend the next annual meeting of the National Educational Association and participate in such special work as may be arranged by the executive board of the association.

LE ROY D. BROWN,
BERNARD L. BUTCHER,
CHAS. W. SMITH,
Committee.

Hon. GEORGE T. ANGELL, president of the Massachusetts Society for the Prevention of Cruelty to Animals, president of the parent American Band of Mercy, and director of the American Social Science Association, who was announced to present a paper on "Bands of Mercy," was unable to be present. He, however, furnished the following paper, which was ordered to be printed in the proceedings of the meeting:

THE NEW ORDER OF MERCY; OR, CRIME AND ITS PREVENTION.

As introductory to the paper I am about to read, I would say that the American Bands of Mercy, founded in Boston, July, 1882, have now over 1,000 branches, with over 100,000 members. They are in nearly every State of the Union and in several of the Territories. They are in schools of all grades, from the primary to the college, and in Sunday schools of all denominations, both Protestant and Roman Catholic. Their object is to teach kindness and mercy to all harmless living creatures, both human and dumb, and such other moral virtues as each band may determine. They are so simple that a boy or girl fourteen years old or younger can, with the instructions we send, form and conduct a band. They cost nothing, as we send to each band formed full instructions and humane literature sufficient to supply their meetings one year without cost. They have been indorsed and recommended by the most eminent educators and educational journals of the country. In the city of Cincinnati alone, largely through the active exertions and influence of Dr. J. B. Peaslee, its superintendent of public schools,

nearly 300 bands have been formed since January 1, 1884, with over 30,000 members.

Crime more than doubled in Massachusetts in ten years prior to 1878. During 1865 there were about 10,000 committals to the various prisons of Massachusetts; in 1875, more than 20,000; in 1876, the average number confined there was still higher; in 1877, higher still. In August, 1878, Mr. Frank B. Sanborn, the late president of our National Conference of Charities, stated that the number of convicts in the prisons of the United States was about double what it was in 1871. The report of our Massachusetts prison commissioners for 1880 shows a large increase of crime as compared with 1879. The secretary of that board tells me that a similar increase of crime in 1880 is shown by statistics in other States. In the year ending September 30, 1882, there were 5,803 more committals to Massachusetts prisons than in the preceding year.

The destruction of property by fire in the United States grew from an annual loss in 1868 of about $35,000,000 to an annual loss in 1878 of nearly $100,000,000. I have not the later statistics.

As long ago as 1876 our Massachusetts State board of charities, in their annual report, used these words: "And now we find that there is hardly a country in the civilized world where atrocious and flagrant crime is so common as in Massachusetts." These are not my words, but the words of our State board of charities. I have no reason to suppose Massachusetts worse than other States.

The editor of the Louisville Courier-Journal, writing of the prevalence of crime, says, in August, 1881, that throughout the State of Kentucky "life seems scarcely more secure than when armed bands of guerrillas swept it from border to border."

Judge Barrows, of Maine, in his charge to a jury, January, 1882, said: "In the earlier years of this State the crime of murder was rare. With a population not much less than now, years went by and it was not heard of. But within the past nine or ten years its frequency has been such that it has become a mere nine days' wonder."

"It is a fact," says the chief justice of the supreme court of Illinois, in an address to the bar of Chicago as far back as November, 1870, "that cannot be denied, that as a people we are undergoing rapid deterioration. Our social, political, and commercial morals are sinking, and day by day we seem to be drifting further and further from our ancient anchorage toward an unknown coast, whose atmosphere is laden with poison and death." These are not my words, but the words of the chief justice of the supreme court of Illinois.

I think we are no worse in Massachusetts than they are in other States. The number of arrests annually made in New York City alone is about double those made in the whole Commonwealth of Massachusetts. During 1880, 71,479 arrests were made in New York City. During

only nine months 228 dead bodies which could not be identified were taken from the waters about that city and buried as unknown.

It is well known that there are now in this country large organized societies of criminals, acting under officers duly elected, bound together by solemn oaths, and controlling large sums of money. "I know," says the late warden of the Massachusetts State prison, in his testimony before the prison committee of the Massachusetts legislature—"I know, of my own knowledge, that there exists in the city of Boston a regularly organized society of criminals, with president, vice president, secretary, and treasurer. This society has a regular form of admitting members. The prison each graduated from, his offence, with information in regard to the prison, are all recorded. The society discusses the most approved plans for burglary, tools, equipments, &c. They keep a register of the best criminal lawyers and of the judges of the courts, and they have a fund for mutual support and protection." This is the testimony of the warden of the Massachusetts State prison. I am told that similar organizations of criminals have been formed in other cities and States.

Our criminals are mostly young men. Out of 415 convicts sentenced to the Massachusetts State prison in a single year, more than half were born in Massachusetts and more than half were not twenty-five years old. The average age of convicts in our Massachusetts State prison was found, some time since, to be only about twenty-four years. The police records of San Francisco, some time since, showed that about three-quarters of those arrested for criminal acts in that city were under twenty years of age, and about one-half of those charged with larceny, burglary, and robbery were boys or young men not twenty-two years old. In New York papers of December, 1883, I find that in the court of general sessions of New York City Judge Cowing called attention to the alarming increase of crime among young men, 90 per cent. of those convicted of burglary and robbery being under twenty-five years of age.

It is not the ignorant alone that fill the ranks of criminals. The chaplain of the Auburn (New York) State prison said some time since that the convicts there constituted one of the most intelligent audiences he ever addressed. Out of 1,368 prisoners, 1,182 had received a greater or less education in our colleges, academies, public schools, and elsewhere. The secretary of our Massachusetts board of prison commissioners assured me, May 12, 1881, that what is stated in regard to the intelligence of convicts in Auburn prison will hold true in regard to the intelligence of convicts in various other prisons.

It is not the uneducated alone that are in training to commit crime. In the various Boston papers some time since appeared the following telegram: "Some two hundred students of —— College got drunk on Thursday night and behaved so outrageously at the Hahnemann fair that all the ladies left and the police were powerless to preserve order.

After leaving the fair they raided about a dozen lager beer saloons, and fighting, riot, and scandalous behavior continued in the neighborhood till daylight, the police being afraid to meddle with them." In the Boston Journal of January 25, 1882, I find that twenty-three students of another college had just been indicted by the grand jury and arrested for crime. These are not exceptional cases. I could quote various other colleges as well to show the spirit of lawlessness which prevails among large numbers of our educated young men.

The facilities for committing crime are constantly increasing. I am assured, on what I believe to be entirely reliable authority, that a machine has been recently invented, costing only $5, with which the skilful burglar can open the strongest safe in any vault of our cities, in thirty minutes, without noise.

A nihilist lecturer recently stated to a Boston audience that there were now about 400 schools in Europe (he did not say how many in America) whose only object is to teach the use of explosives; that about sixty tons of tri-nitroglycerine, having ninety-three times the power of gunpowder, are now concealed, ready for use; that he carried dynamite always in his pocket, and two ounces of an explosive he had, put at the entrance of the Tremont Temple, where he was lecturing, would destroy the life of every person in that building.

Science is making wonderful progress. Steamers can be blown to atoms in mid-ocean, railroad trains be wrecked, safety vaults and magnificent piles of architecture changed in a moment to shapeless ruins. It is perfectly certain that the criminal classes of the future are going to know all about these things, and it is becoming a most momentous question, How are we going to stop the growth of crime?

It is certain that education of the intellect alone will not do it; that only gives increased power. The churches and Sunday schools alone cannot stop it, for they do not reach the great masses who never attend them. In some States not more than half the people attend the churches and in some States probably not more than a quarter, and only a similar proportion of children attend the Sunday schools.

Is this state of things, under present influences, likely to grow better? See the hordes of immigrants pouring in upon us from all nations of the civilized world, all to become voters. See the innumerable millions of China and the East that cannot be much longer kept out. Add these chances to present statistics, and then figure it out, if you can, that this continent is not to become the great battleground of the world between the powers of good and evil.

I see it stated in the papers that one great secret organization, "the Knights of Labor," numbers already nearly two millions of members, all combined to resist and, if necessary, wage war on capital, which they declare is waging war on them. Are these controversies to be settled in the future humanely by arbitration and the ballot, or how are they to be settled? This is going to be a great question before long,

and it may be much sooner than we expect. Four hundred schools in Europe, we are told, are teaching the use of dynamite, and its apostles are not few nor far between.

If we drift into another civil war, where will be found these great and growing criminal classes who never enter church or Sunday school, who believe property should be divided or destroyed? Will they or will they not come to the front, as they did in the French revolution, and what is the remedy? Pass more stringent laws, perhaps you say. How are you going to pass them and how are you going to enforce them when more or less men on every jury (and it may be some of your judges even) are in sympathy with crime?

It was ascertained some time since that on the voting lists of the city of Boston were the names of more than 6,000 persons who had been convicted of crime. Put more work into the Sunday schools, perhaps you say. That's all very well; but what are you going to do with the millions that never enter the Sunday schools?

I do not seek to disparage our present great and powerful instrumentalities of good and the army of noble and self sacrificing men and women engaged in them. I only seek to show that in spite of them all crime is increasing far beyond our increase of population, and seems likely to increase still more in the future, and that new measures must be adopted. What can we do? I answer: In my judgment there is only one way. We must go straight to the foundations and begin with the children in our public schools, and that will be the quickest way to reach the parents. If we want to stop lawlessness and crime, we must begin with the children in our public schools. Nearly all the criminals of the future, the thieves, burglars, incendiaries, and murderers, are now in our public schools, and with them the greater criminals who commit national crimes. They are in our public schools now and we are educating them. We can mould them now if we will. To illustrate the power of education: We know that you may make the same boy Protestant, Roman Catholic, or Mahometan. It is simply a question of education. You may put into his little hand, as first toys, whips and guns and swords, or you may teach him, as the Quakers do, that war and cruelty are crimes. You may teach him to shoot the little song bird in spring time, with its nest full of young, or you may teach him to feed the bird and spare its nest. You may go into the schools now with book, picture, song, and story, and make neglected boys merciful or you may let them drift until, as men, they have become sufficiently lawless and cruel to throw your railway trains off the track, place dynamite under your dwelling houses or public buildings, assassinate your President, burn half your city, or, as nihilistic leaders, involve the nation in civil war. Is it not largely, if not wholly, a question of education?

I say, then, that our remedy against the lawlessness and crime now so rapidly growing in this country lies in the humane, which will be found

to include also the moral, education of the children, and that this is also the shortest road to reach the parents.

For the purpose of humanely educating the children of this nation was founded in Boston, on the 28th of July, 1882, the American Band of Mercy. Among its earliest members were the governor of Massachusetts; the mayor of Boston; the chief justice of our Commonwealth and other judges; the Roman Catholic archbishop of Boston, who has caused one to be established in his cathedral, with about 1,500 members, and has given us permission to establish them in all the Sunday and parochial schools of his diocese; the leading editors of our religious and educational papers; and several hundreds of clergymen of all denominations, Protestant and Roman Catholic; and it has now, in something over a year, over 1,000 branches, reaching from the Atlantic to the Pacific coast and from the Gulf of St. Lawrence to the Gulf of Mexico, and numbering over 100,000 members. These branches have been established in Sunday schools of all denominations, both Protestant and Roman Catholic, and in schools of all grades, from the primary to the college.

Its badge is a five-pointed star, on which are the mottoes "Glory to God," "Peace on earth," "Good will to all," and on the five points of the star the words "Kindness to all harmless living creatures." Its cards of membership have a beautiful picture of the "signing of the pledge," with these lines:

For lo the days are hastening on,
  By prophet bards foretold,
When, with the ever circling years,
  Comes round the age of gold;
When peace shall over all the earth
  Its ancient splendors fling,
And the whole world give back the song
  That now the angels sing.

Its pledge is: "I will try to be kind to all harmless living creatures, both human and dumb, and will try to protect them from cruel usage." It is thus both an order of mercy and an order of chivalry. Its object is in all possible ways to encourage its members to good, generous, noble, and merciful lives and deeds. Whenever a brave, kind word needs to be said, say it; whenever a brave, kind act needs to be done, do it. It aims to use at its meetings every song, poem, picture, and story which will promote the objects for which it was founded, and, when practicable, endeavors, by public Band of Mercy concerts and otherwise, to reach all outside whom it can reach and influence. Its methods of organization are so simple that any boy or girl of ordinary intelligence fourteen years old can organize a Band of Mercy. Its exercises occupy such part of school or Sunday school or other time as each band for itself arranges. It costs nothing, for all that it requires is the simple pledge, nothing more. To be sure, it has a membership book for each band that wants one, which costs six cents; beautiful imitation gold and

silver badge pins for those who want them, which cost 8 cents; ribbon badges, which cost 4, and handsome cards of membership, which cost 2. Some 70,000 of these cards and badges have been already sent out. But they are not necessary. All that is required is simply the pledge. It sends, without cost, to each band formed of over forty members (1) an order of exercises and full information as to what to do and how to do it; (2) ten very interesting lessons on kindness to animals, full of stories and instruction on that subject, and which have already gone to over 20,000 teachers of public and private schools and are now being introduced into Sunday schools; and (3) a copy for one year of its monthly paper, Our Dumb Animals, filled with interesting anecdotes and other matter, encouraging kindness both to animals and human beings. It sends also to each band leaflets containing Band of Mercy hymns and songs, adapted to popular music and suitable for both school and Sunday school exercises. All these are sent without cost. To every teacher who forms a band of twenty or more, it sends, in addition to these, a beautiful badge pin, without cost.

It is not the intention to have a word said or quoted in any band that will give offence to any religious denomination, or to require the teaching of anything but kindness and protection for the weak; but it is the hope of its founders that teachers and officers of all bands will, so far as practicable, endeavor to inculcate not only thoughts and habits of mercy, but also a firm belief in the Infinite Ruler of the Universe, upon whose mercy we depend. This can be done, without in any manner interfering with sectarian beliefs, by showing how the whole natural world is full of the evidences of His wisdom, power, and goodness.

It is our earnest hope, also, that teachers and officers of all bands will, so far as practicable, inculcate the great doctrine of immortality. We think it can be shown, without conflicting with the religious views of any denomination, that the sacred books and religious beliefs and recorded spiritual experiences of all ages and nations teach it; and that, if all these evidences were wanting, still the common sense of mankind would show the necessity of another life to right the wrongs of this one, and that a power so great and good as is revealed in this universe would never permit saints, martyrs, and holy mothers to simply share with pirates and murderers a common annihilation. We think that any system of teaching mercy which ignores the merciful God and a future life, in which the wrongs of this one shall be righted, must be defective and unsatisfactory.

It will not be difficult to teach with mercy, also, in similar ways, peace, temperance, truth, honor, honesty. We think it will be found on reflection that mercy includes them all and that no man can be truly merciful without them. But we require only the pledge, "I will try to be kind to all harmless creatures and will try to protect them from cruel usage." And we have abundant evidence that the teaching of this alone will prevent both cruelty and crime.

The experience of French and English schools during many years has shown that children taught kindness to animals only become not only more kind to animals but also more kind to one another. This matter has been deemed so important that not only are regular lessons on this subject now given in over 5,000 schools of France and the minister of public instruction has ordered publications teaching it to be circulated in French schools, but also in those schools have been formed large numbers of societies of youth and children to protect the lower animals from cruelty.

In one department of France alone there are now about 500 of these societies, and in some of the Roman Catholic dioceses of France children are not admitted to first communion until they promise to be kind to animals. For the same object large societies of youth and children have been formed in Germany, Denmark, Russia, Switzerland, and Great Britain. It is probable that more than 100,000 English school children are to-day members of these associations. In proof of the established fact that this teaching not only prevents cruelty but also crime, in England public attention has been called to the fact that out of about 7,000 children carefully taught kindness to animals, during a series of years, in one English public school, not one has ever been arrested for any criminal offence. It was ascertained some time since, by inquiry in American prisons, that out of 2,000 convicts inquired of only 12 had any pet animal during their childhood.

We know that simply teaching kindness in our Bands of Mercy—to be more merciful to the aged, weak, and suffering; to feed the song birds and spare their nests; sprinkle ashes on streets, that men and horses may not fall; put the blankets that have blown off horses on again and tuck them under the harness; kill fish as soon as they are caught, as Agassiz taught his pupils; protect the useful toad; avoid treading upon the useful and harmless worm even — will have a mighty influence to prevent many from becoming criminals and make them good, merciful, and law-abiding citizens. I could easily fill an hour with good anecdotes illustrating the power of teaching kindness to the lower creatures; and for illustrations of the power of teaching kindness to the higher we have only to look at the histories of the Quakers and Moravians.

Indeed, if all the world were Quakers and Moravians, what would become of the prisons and what would become of armies, navies, and fortifications? The Quaker colony of Pennsylvania required for seventy years for its protection against Indians only a few constables. That was the fruit of humane education.

Is it not possible to educate our children just as humanely without making them Quakers or Moravians? I have heard the question asked, "Will not this humane education unfit our boys for soldiers?" I answer that a boy who has been trained to protect a dumb beast from cruelty will fight, if need be, none the less bravely for his home and coun-

try. There were no braver men in our last war, North or South, than those that went from our most cultured homes. There have been no braver men or women in any age than those sons and daughters of mercy who, since that war, went down into the yellow fever hospitals of the South to nurse the sick and comfort and cheer the dying.

But suppose a band should teach only one thing: kindness to the lower creatures, those that cannot speak for themselves. Saying nothing of the increased protection to animals, when you are teaching children to love and do acts of kindness for these creatures which the poorest boys and girls are meeting forty times a day in the streets and having opportunities of doing little acts of kindness to, you are teaching what will bring a whole world of new happiness into the whole future lives of the children.

I shall never forget seeing on the capitol grounds at Richmond, Va., tame gray squirrels running over the grounds and feeding from the hands of the children, and I told the people whom I addressed there, truly, as I believe, that those squirrels were worth their weight in gold to the city of Richmond for the kindness they put into the hearts of the children. I have in my own home a little bird that weighs less than one ounce after dinner; yet he brings into my home a happiness that for thousands of dollars I would not lose. He follows me from room to room, flies to my head, my shoulders, my fingers, stands on my table and watches me as I write. In the morning he sings his little songs of thanksgiving, about sundown his evening hymn, and later, at intervals, I hear soft, sweet notes, which I love to think may be his little prayer to his Maker and mine. It is only one little bird weighing less than an ounce, yet I know that he makes my life both happier and better.

And I could easily fill an hour with the testimony of men and women of almost every position in life—from the poor, sick colored man at Louisville, Ky., who, when told that to enter the city hospital he must abandon his dog, declared with tears in his eyes that the dog was the only friend he had in the world and he would rather die with him in the streets of Louisville than abandon him, up to Sir Walter Scott, and Sir Edwin Landseer, and Petrarch, and Cardinal Wolsey, and Richelieu, and Daniel Webster, who, just before he died, asked that all his cattle might be driven to his window, that he might see them for the last time, and a thousand more like these—who might be cited to show how millions of lives have been and other millions may be made happier by a love for God's lower creatures.

And then comes the influence of this teaching on crime. I am sometimes asked, "Why do you spend so much of your time and money in talking about kindness to animals, when there is so much cruelty to men? And I answer, "We are working at the roots. Every humane publication, every lecture, every step in doing or teaching kindness to them, is a step to prevent crime," a step in promoting the growth of those qualities of heart which will elevate human souls, even in the dens

of sin and shame, and prepare the way for the coming of peace on earth and good will to men. There are hundreds of thousands of parents among the depraved and criminal classes of this country whom no child can "be taught to love or ought" to be. There are hundreds of thousands of homes where the name of the Almighty is never heard, except in words of blasphemy. But there is not a child in one of those homes that may not be taught in our public schools to feed the birds and pat the horses and enjoy making happy all harmless creatures it meets on the street, and so be doing acts of kindness forty times a day, which will make it not only happier, but better and more merciful in all the relations of life.

Standing before you as the advocate of the lower races, I declare what I believe cannot be gainsaid: that just so soon and so far as we pour into all our schools the songs and poems and literature of mercy towards these lower creatures, just so soon and so far shall we reach the roots not only of cruelty but of crime.

A short time since I was written to by order of an association of the leading citizens of one of our largest western cities, and the question was asked, "What can we do to stop the growth of crime?" I answered, "Form a Band of Mercy in every public school of your city as quickly as you can." So you will reach the children at once, and through them, and their cards, badges, and humane literature, you will reach also the parents.

My friends, have you anything better? It costs nothing. It opens in every school where it is formed a door or channel through which we can pour into the school our humane literature and education. It can do no harm. It may do infinite good, not only in this generation, but in the great future, when we shall have ceased from our labors.

No man can tell the influence that may go out from even the smallest band to bless our country and to bless the world. Millions are expended in building monuments in our cemeteries. I know of no way in which any man or woman can build a better monument than by founding a band or bands of mercy, dedicated to the glory of God and the highest welfare of His creatures, both human and dumb.

Mr. RICHARDS introduced the following, which was adopted:

Resolved, That we heartily approve of the American Bands of Mercy and welcome their introduction into the public schools of our country to aid in the moral education of our people.

Mr. BICKNELL read the following:

Resolved, That, in view of the great and increasing interest in the subject of Indian education in this country, a committee of five be appointed by this body, to report to the National Association at the next meeting at Madison, July 15–18, 1884, concerning the best method of solving the difficulties now connected with that very important subject.

The resolution was adopted and the following were named as this committee: Messrs. Dickinson, of Massachusetts; Pratt, of Pennsylvania; Haworth, of Kansas; Speer, of Kansas; and Salisbury, of Georgia.

Mr. BICKNELL, president of the National Educational Association, called attention to the forthcoming meeting of that association at Madison, Wis., and outlined the advantages of the city for an assembly of this character. He mentioned the exceedingly low rates that would be given attendants both by railroads and hotels, and specified a number of interesting places in different portions of the West to which excursionists could have access.

Mr. MACALISTER followed, urging all interested in education to attend these meetings.

The members of the Department then listened to the presentation of the following facts with reference to the education of the color sense and color blindness by B. JOY JEFFRIES, M. D., of Boston:

THE EDUCATION OF THE NORMAL COLOR SENSE.

COLOR-BLINDNESS.

The two senses, if we may so speak, which the eye possesses, namely, *form* and *color*, are so associated and unconsciously used together that we are apt to forget they really are quite distinct and may even exist quite independently. A diagrammatic section of the human eye shows that it is in fact a camera obscura. For a perfect picture in a camera, our lenses must be clean and transparent and the focal adjustment exact. Just so in the human eye. Tears on the cornea blur our sight; so also want of transparency of the crystalline lens, namely, cataract, dims objects. In the same way want of focusing prevents a sharp picture from being formed on the retina, and hence there is indistinct perception of form. Now, all the dioptric apparatus of the eye may be only semi-transparent, the cornea blurred, or the lens cataractous, and yet we can perceive color. A person may have cataract so far advanced as to interfere with form perception to the extent of not being able to walk about, and yet he will perceive colors quite well. In a fog, when we can see no *form*, we *can* see *colored light*. Hence the value of color for signals. Moreover, we may remove the whole of the dioptric apparatus, leaving simply the percipient surface, the retina spread out, and light striking this will give us color.

RETINAL RODS AND CONES.

The final terminal elements of the optic nerve fibres in the retina are the so-called *rods* and *cones*. The distinction between form and color perception is seen here also. The rods are supposed to give us form and the cones color perception. The former are found alone in the retinæ of those animals who do not need color, as the night animals, or those living in the mud, &c. The cones are in excess in proportion to the animal's apparent need of the chromatic sense, as the birds, &c. In other words, we have an anatomical basis for the difference of the two senses or sensations. In man we have both rods and cones, the latter very delicate and

packed closely together at the spot in the centre of the retina where vision is best for both form and color.

FORM SENSE HAS BEEN STUDIED.

The sense of form has been very particularly studied since the invention of the ophthalmoscope by Helmholtz in 1852. Some knowledge of the errors of refraction and accommodation of the eye have been diffused in the community by professional specialists, so that even the text books embrace a description of myopia, hypermetropia, and astigmatism. These terms are probably familiar to most educators, since school work and its surroundings have been shown to be so potent a factor in the production of nearsightedness. It is to you educators that we specialists must appeal, since it lies within your power to do much towards the saving children's eyesight by insisting on the correction of the abuses that have crept into school work, school-houses, and school books. As to the last, the evil has gone so far as to begin to correct itself. My own recent contribution towards the cause lies on the table for gratuitous distribution. I shall be happy to send it to any one applying to me hereafter. It is entitled Our Eyes and Our Industries, being an article prepared at the request of the Massachusetts State board of health and published in their fourth annual report, 1883. It appeals to all educators.

COLOR SENSE NOT STUDIED.

Till within a very few years the color sense has not been studied or hardly recognized outside of the physiologist's laboratory. The very practical bearings of its defect have recently brought the question of the chromatic sense prominently forward, so that at present some of the strongest men in science are actively engaged in experiment and study of the normal and abnormal sense of color. It may be fairly said that the defect had been forgotten, so that recorded cases had become almost classical, the name of Dalton still giving the peculiarity its appellation. The French even yet hold to the term *daltonisme*, largely, perhaps, because they have no short single term as the English color-blindness. It has, of course, been recognized for the last hundred years as a sort of a scientific curiosity that certain persons do not see colors as do the majority. From want of examination and study, the extent and the meaning of this have been unknown, as have also the facts relating to the normal chromatic sense. The invention of the ophthalmoscope gave an immense impulse to the study of the physiology of vision, with, fortunately, most practical results for mankind. Some of the conditions of form and color vision of importance to be remembered must be here explained, introductory to color defects and color teaching and education.

FORM AND COLOR SENSE BEST IN CENTRE.

The retina is often and very truly compared to the plate of the camera on which the picture is made. But if our photographic plates were like

the retina we never should obtain a picture, for it is only over a very small space directly in the centre that vision for form and color is perfect. This is the case to an extent that will hardly be believed till experimentally proved. Look, however, with one eye, while the other is shut, at a word as long as *constitution*, on a printed page, at the distance of ordinary reading. It will be found that the space on the retina good enough to give us the necessary form perception to read the letters will not embrace more than about the first three or four letters. Our eye has to travel along the word to catch it. This, however, the many and strong muscles of the eyeball allow us to do, so that we do not notice either the imperfection or the necessary effort.

Now, the same is true as to the color sense. It is only at the centre that we have a perfect perception of color; from here outward towards the periphery our chromatic sense is gradually weaker. This is readily shown by closing one eye and gazing at a red wafer held in front of the other eye; then, while keeping the eye fixed, moving the wafer gradually to one side. Its color will be lost and it appear quite black, when we can still distinguish its shape. Of course this experiment has nothing to do with the want of any perception corresponding to the entrance of the optic nerve into the eyeball, the so-called "blind spot." This peripheral, feeble color perception we do not notice, in the same way as we do not notice the corresponding want of form perception away from the centre, because our eyes are so easily turned to bring the color over the centre of the retina, where perception is perfect. This is the case in ordinary illumination. The spectral colors, when sufficiently strong, will be seen quite out to the periphery. This does not hold, however, with our ordinary sight.

FORM AND COLOR AFTER-IMAGES.

The two functions of the eye bear a peculiar relation to each other in a still further respect. This fact, so well known and understood physiologically, seems quite unknown otherwise, and yet it has a very strong practical bearing, apparently till now quite overlooked. If we pinch our arm hard, there remains a sensation of pain even after the hand is removed. It fades gradually away. Every sensation when at all prolonged is continued after the stimulus or irritation is removed. With retinal impressions there is still another important peculiarity. On awakening in the morning, when the retina, from rest, is quite sensitive, if we direct our eyes to a print on the wall in a dark frame for a few seconds and then turn our gaze to the ceiling or a blank space on the wall, we shall see the picture *there*, and it will appear wherever we turn our eyes so long as the after-image or impression remains on the retina. The experiment will succeed at any other time as well if we gaze steadily long enough. Now, on carefully considering this after-image which the brain projects into space, it will be seen that instead of a dark engraving in a dark frame we have a white print on dark in a light frame; in

other words, the complementary. This is always the case, and it holds true of the color sense, as we can see by experiments for colored after-images.

COLORED AFTER-IMAGES COMPLEMENTARY.

Here hung up is a white surface, and on it a small black cross. Over the cross I hold a disk of red. In the centre of the red is a black spot. Now, if you gaze at this black spot quite steadily while twenty are slowly counted and when the colored disk is removed continue to look at the black cross on the white surface, you will gradually see not a red but a green disk. Now, when the experiment is reversed by exposing a green disk to you, the after-image comes of a reddish tinge; in other words, the complementary of the original.

These facts, so readily experimentally shown, seem to have escaped general observation, yet they have a very practical side. A painter cannot turn from one color to another till the impression of the first has faded from the retina. A pilot watches a red (the port) light ahead of him steadily till it is fixed on his retina. The vessel on which it is, turns so that he cannot see it, or he turns his gaze away, when, on looking back to where the light was seen, it appears as a green one (the starboard). This soon fades away (apparently to him turns away) and he is puzzled to know which he really saw. But upon this decision, which must be instantly made, depends his change of helm to avoid collision. The same in reference to the red and green (danger and safety) railroad lights as they appear to the engineer, who has even less time than the pilot for decision. Yet this now well known phenomenon has never been applied in solution of unaccountable collisions where it may well have been the cause.

THREE COLOR RETINAL ZONES.

In the centre of the retina we have perception of all three of the primary colors, red, green, and violet. In a zone outside of this red fails, and we see green and violet. Again, in the zone beyond this to the periphery we can feel only violet or blue. This, as before said, holds true of ordinary pigments in ordinary illumination. The spectral colors, red, green, and violet, when sufficiently intense, may be perceived from the centre to the periphery of the retina.

RED, GREEN, AND VIOLET ARE PRIMARY COLORS.

Science has long ago shown that these are the true primaries. I would, however, call attention to the fact that still in text books, color-charts, and even educational reports, the primaries are spoken of as red, yellow, and blue, as if Helmholtz had not thirty years ago shown Brewster's mistakes in experimenting. Educators must have the text books at least cleared of false instruction. I have met, when I least expected it, such total ignorance of the fact that red, green, and violet

were the real primaries—so proved by science—that, while to defend myself seems almost puerile, yet I must refer doubters to some standard works within their reach.

Prof. Ogden M. Rood says, in his Modern Chromatics, page 109:

This theory of the existence of three fundamental kinds of light, red, yellow, and blue, is found in all except the most recent text books in physics, and is almost universally believed by artists. Nevertheless it will not be difficult to show that it is quite without foundation.

In Von Bezold's Theory of Color, translated by Mr. Koehler and published in 1876 by Mr. L. Prang, at Boston, is, on page 128, the following:

Red, yellow, and blue were generally looked upon in former times as the fundamental colors, the results obtained by the mixture of pigments having been accepted as a basis. Later investigations lead to the conclusion that green must be substituted for yellow, and a variety of reasons might be cited, all of which speak unanimously in favor of assuming red, green, and a blue which borders closely upon violet to be the fundamental colors.

I would refer you, also, to another book, perhaps more within reach, namely, Alfred M. Mayer's and Charles Barnard's little volume on Light, in the Experimental Science Series for Beginners, pages 95–100.

Another book in German, Dr. Hugo Magnus's Farben und Schöpfung (Color and Creation), gives the whole very simply and clearly.

All lecturers on physics, when touching on color, give the true explanation, as have those in special courses for art societies, &c.; therefore, while there may formerly have been some excuse, there hardly is now, for such a letter as I recently received, which reads as follows:

My Dear Sir: Don't you think it would be advisable to leave with the philosophical crank who first started it the idea that green is a primary color (viz, one that cannot be resolved into others or that cannot be compounded from others), when any child with a 10-cent box of colors can in five seconds demonstrate the contrary?

The books mentioned explain the physical condition from mixing pigments and how it is not a mental combination of colors.

TRUE COMBINATION OF COLORS.

Colors may be properly combined in different ways. One of the simplest is Maxwell's rotating disks, which takes advantage of the persistent retinal impression already described. By it before one color has faded another is presented to the retina, and we thus have a true mental or cerebral combination or mixture.

Woinow's disk for detecting color-blindness will show the combination of the three primaries. There are concentric circles, each composed of two of the primaries in equal parts. When the disk is revolved the *red* and *green* circle becomes *yellow*, while the *green* and *violet* becomes *blue*. The same can be done with the spinning top, as described by Mayer.

Among school apparatus is a revolving disk arranged with the old

idea of the seven primary colors, which, when combined by rotating, produce white, or rather a pale gray. Now, as may be seen, a disk made up of red, green, and violet, even in equal parts, and the colors not especially chosen as to purity, &c., will give us gray when rotated. Again, every child knows as well as the artist that if he mixes yellow and blue paint they will make green, but a disk of yellow and blue when rotated gives us gray, not green. Thus can be readily taught the difference between the mixing of pigments and the combination of colors.

Another simple method is to place our colors on a white surface and holding a piece of plate glass resting on the surface at right angles between the colors look at one of them at an angle of 45° through the glass while the other is at the same time reflected into the eye, and we shall have a *true* combination or mixture. All these are of course well known facts and experiments in physiology, but I show and describe them here in order that you may see just how to illustrate them in school with color teaching.

COLOR-BLINDNESS.

It has been seen that some knowledge of the color sense is both necessary and of value before undertaking to educate it. It is of course still more necessary to understand and appreciate the *defects* of the color sense, especially since such defects are now readily discovered and can never be overcome. In other words, it is useless to attempt to teach the color-blind to see colors that are beyond their sensation, so to speak. How many color-blind are we likely to have in our schools? The proportion will of course be the same in the community at large. I give in my manual reports of nearly two hundred thousand examinations. I have myself tested 19,298 males and found 805 color-blind, about 4 per cent. Among 14,940 females I found only 12 defective in the chromatic sense. This is a much smaller per cent. than other examiners have found. We may say in general that 4 per cent. of males and one-fourth of 1 per cent. of females are color-blind. I hasten to answer the question that at once arises by saying that the best authorities recognize this as simply a sexual difference. It has nothing to do with the greater familiarity on the part of females with colors, &c. Color-blind females act as do color-blind men in relation to the defect. No time is allowed us to discuss this interesting question here.

DIFFERENT KINDS OF COLOR-BLINDNESS.

Corresponding to the three primary colors, we have three kinds of color-blindness, namely, *red*, *green*, and *violet blindness*. The first two include each other. The last includes blindness to yellow. This violet-blindness is so rare that the term color-blindness as now generally used means that *red* and *green* are not seen as they are by the normal eye. How, then, are they seen; in other words, what is color-blindness? I will quote from my manual in answer: "Does red look green to them, or

green red, or yellow blue, &c.? The fact so long ago noticed that they could not distinguish their faulty color from gray—a mixture of black and white—and the more color-blind they were the darker the gray which could match their faulty color, ought, perhaps, to have had more attention paid to it. Through this we can, perhaps, get a better idea of the color-blind's vision. And we may formulate their vision thus: All colors containing their defective one will be grayish, and this in proportion to their individual amount of defect." The red-blind sees all objects of this color of a darker hue than they are. The same of the green-blind as to green. Both confound these colors with each other and gray. A mixture of white and black in proper proportions, to represent the luminosity of any shade of red or green, will give the color-blind the same sensation as that shade. Great misunderstanding of the color-blind's sensation has arisen from the natural lack of knowledge and appreciation of *composite* colors. Purple, or a combination of red and violet, or blue is rarely otherwise spoken of than red in popular language, except where the commercial name *magenta* is used. The blue or violet in it the normal-eyed do not think of, and none would class it with blue. The color-blind, however, do not see the red in it other than gray; but, as their vision is perfect for violet, they see this in the purple, and so class it with blue. Hence the general idea that the color-blind confound red with blue, the sky and a rose. Pure red they never confound with blue.

The colored diagram shown you exhibits the spectrum as seen by the normal eye, a *red*-blind and a *green*-blind. Red and green, as is seen, fail. The theory of color perception cannot be here discussed from want of time. That which is now known as the Young-Helmholtz theory seems to best fit the facts of defective chromatic sense in all its phases. Scientific experts are now engaged in the study of the several theories as applied to the real cases within their reach to examine. Fortunately we need not depend on any *explanation* of the facts to understand and appreciate the force and meaning of these latter in reference to color-blindness. And we may directly turn to some of the points necessary to be remembered.

COLOR-BLINDNESS IS CONGENITAL AND HEREDITARY.

It is a condition of the eye or the brain with which a person is born, and is handed down under the general law of heredity, that has been found to hold in reference to bleeders and to night-blindness, &c. The general law as to color-blindness is "that sons of daughters whose father was color-blind are most likely to be the same, although not without exception; or color-blindness is transmitted in the revertible type from grandfather to grandchild." Family trees of seven generations have shown this. Thus it is seen that if a color-blind has three sons and two daughters none is likely to be defective; yet the defect is transmitted through the daughters, whose sons are likely to be. These daughters,

as we know, are almost exempt. Yet the necessary exception to prove the law exists in a family where *only* the daughters were color-blind, and *all* of them for some generations. The cases of color-blindness which do not at first seem to conform to the law of heredity have been found explainable by the fact that color-blind families intermarried, bringing it into two succeeding generations.

MONOCULAR COLOR-BLINDNESS.

There have been already several extremely interesting cases of color-blindness in one eye reported by very competent observers. These have naturally attracted a good deal of attention and have been carefully studied. They confirm our previously formulated ideas as to just how the color-blind see colors. The person can tell us through his other normal eye what he sees with the defective one, and this is of great importance in relation to the establishment of one of the theories of color perception now so much discussed.

HYPNOTISM AND COLOR-BLINDNESS.

Curious facts have been discovered that cannot here be given in detail, but they are substantially that some of the color-blind who can be put in the hypnotic state will then see color as do the normal-eyed. Moreover, that some of the normal-eyed who can be hypnotized will, while so, become color-blind. This is now generally admitted, but does not seem to have the force or meaning first attached to it.

COLOR-BLINDNESS FROM ALCOHOL AND TOBACCO.

Alcohol or tobacco poisoning produces a condition of feeble chromatic sense amounting to color-blindness; the two combined, still more so; but it must be understood and remembered that many people use or abuse alcohol or tobacco, or both, without exhibiting their poisonous effects. Yet the effect, when it comes, is insidious, so that a pilot or an engineer may preserve his form perception well enough to keep on with his employment, while his sense of color may, unknown even to himself, have so deteriorated as to render him untrustworthy.

COLOR-BLINDNESS FROM DISEASE AND INJURY.

A total or partial loss of the chromatic sense may be a symptom of disease of the brain or eye; so also it may be caused by injury that affects the nervous system or centres. All employés who read or give colored signals, on land or sea, ought to be carefully tested after any serious sickness before they resume their duties. It is just such men that are liable to the injuries that affect the nervous centres by what is called *shock*.

COLOR-BLINDNESS UNIVERSAL.

Examinations by competent observers have been now made of civilized and uncivilized people under all climates and conditions, with

pretty much the same result, viz, 4 per cent. of males and one-fourth of 1 per cent. of females being found defective. Variation from this is most probably due to unskilful testing or faulty methods, or from lack of extensive observation. I judge that it requires some thousands of examinations to eliminate, so to speak, local sources of error and to get at the real percentage of the defect among a given people. In the schools of the same city among the same social classes, containing from 300 to 600 scholars, the ratio varied from 2 to 6 per cent. When, therefore, gentlemen report greater or less than 4 per cent. among any given tribe or people, based on the testing a few hundred people, I think we may fairly doubt their generalization as to the whole race. We must be assured of the observer and his method for scientific accuracy.

PALLIATION OF COLOR-BLINDNESS.

It has long been known that the color-blind do not make such gross mistakes in artificial light, except the electric and lime light. Many have learned to carry their doubtful colors to the gas to help them decide. This assists those who are only partially defective more than the others. Looking through a glass stained a pale lemon or orange with oxide of silver so simulates gas or artificial light as to give the color-blind the same help in deciding what color is before them.

Professor Delbœuf, of Lille, himself a color-blind, discovered that looking through a solution of fuchsine, one of the aniline dyes, gave him the same sort of assistance. With this he was so pleased that, as secretary of a committee of the Belgian Royal Academy, he advised the government to have attached to the locomotive engine an apparatus arranged for the color-blind engineer to look through and decide what light he saw, red or green. More practical people would give the engineer other employment. Delbœuf finally imagined that he had, by constantly looking through a little wedge-shaped tank holding a solution of fuchsine, really palliated or cured his color-blindness. He announced the discovery, but it has proved merely another mistake, such as the color-blind are constantly making in reference to their defect. The color-blind depend on light and shade to determine between red and green and the colors containing them. They become wonderfully sensitive to shades. Now the fuchsine solution gives a new relation of light and shade to red and green, and hence a new range for the color-blind. But the congenital sense is not altered. Color-blindness can be palliated as described; it cannot be altered or cured, notwithstanding the curiously mistaken reports from the very intelligent people who have supposed that they had found a cure. Its incurability in relation to school children is so important and such blunders and false deductions have been made on these points that I will dwell especially upon it at length when coming to the question of color-teaching itself. I some years ago drew particular attention to the subject.

HOW HAS COLOR-BLINDNESS BEEN KEPT CONCEALED?

We now know that some forty out of a thousand males whom we meet are color-blind. Why are they not detected and how have they escaped exposing their defect in every-day life? True, we have not formally tested them, but now that we have found them out it seems impossible that they could always have been so defective. They and their friends and relations will readily deny it. A little explanation will be of service to educators who are to introduce color-teaching.

In the first place, we must recall the great ignorance—now so well understood—of the common names of colors among the normal-eyed males of all classes in the community and the misuse of names known. The color-blind simulate just this sort of ignorance in every-day life, and hence escape detection through the lack of education of the normal-eyed. Hardly any two people seem to agree as to the names of certain colors. The color-blind hearing and seeing this imagine that their own doubts and mistakes arise from the same cause. A careful examination, however, will reveal the fact that there is really no difference in the sensation of color of the normal-eyed. They will perfectly agree as to whether two colors are alike in shade or tint. Education will cause them to agree as to what the colors really are, that is, of what composed, &c. The color-blind stoutly resist being classed as deficient, so assured are they that they lack only names, and this even when a most amusing and convincing proof of their defect is before the bystanders. Professor Dalton long ago spoke of this in reference to himself and three of his pupils who were equally defective.

I perhaps cannot do better than to quote briefly from my manual, where this point is fully discussed. "The color-blind who are quick-witted enough to discover early that something is wrong with their vision by the smiles of their listeners when they mention this or that object by color, are equally quick-witted in avoiding so doing. They have found that there are names of certain attributes they cannot comprehend, and hence must let alone. They learn, also, what we forget, that so many objects of every-day life always have the same color, as red tiles or bricks, and the color names of these they use with freedom, while they often, even unconsciously, are cautious not to name the color of a new object till they have heard it applied, after which it is a mere matter of memory stimulated by a consciousness of defect. I have often recalled to the color-blind their own acts and words, and surprised them by an exposure of the mental jugglery they employed to escape detection, of which they were almost unaware, so much had it become a matter of habit. Another important point is that, as violet-blindness is very rare, the vast majority of defective are red or green blind. These persons see violet and yellow as the normal-eyed, and they naturally apply these colors correctly. When therefore they fail in red or green a casual observer attributes it to simple carelessness; hence a very

ready avoidance of detection. It does not seem possible that any one who sees so much correctly, and whose ideas of color so correspond with our own, cannot be equally correct throughout, if he will but take the pains to notice and learn. Color-blindness is also a constant source of petty annoyance and mortification, which teaches its possessor to be on constant guard over himself in avoiding exposure and its consequent irritation. The intelligent color-blind finds many ways of drawing a decision of color from those he is in contact with, and always lets shopkeepers pick out the colors he calls for, just as the color-blind shopkeeper lets his customer do the same if he can; and when he fails in this, and makes mistakes enough to lose his place, he can take refuge in the mourning stores, where his defect is an advantage."

This brings us again to their extraordinary appreciation of light and shade. They can sort and place in correct order a series of shades of red or green much better and more quickly than the normal-eyed, because to them the color is so much light and dark. Now, an educated color-blind is asked by a lady friend to buy a skein of red worsted to match the pattern. He asks the attendant in the store for red worsteds, and selects the one which corresponds in *luminosity* with his pattern. Such good "shopping" forbids the idea of any chromatic defect. But the worsted attendant is away, and another, who is color-blind, quietly hands over the *greens* to the purchaser; the latter will then complacently select the one which matches in luminosity his *red* pattern.

HOW CAN WE DETECT COLOR-BLINDNESS?

It has been seen that asking the color-blind the names of colors is of no use. They may use them rightly or guess correctly. Helmholtz long ago showed that such testing was simply silly. Since we cannot trust the tongue, what can we do? The only other way to find out how a sensation affects another person's brain is by getting him to do something; in other words, make some muscular effort. On this and the basis of comparison is dependent the test introduced by Professor Holmgren, of Upsala, Sweden, known as the worsted test. I must refer you to my manual for a full description of it, and would particularly warn you that its application is by no means so simple as it seems. Many officials have been thus deceived and caused a laugh at their expense. Study and experience with it may enable educated teachers to apply it in their schools, where a mistake is not of such importance as it would be in reference to a pilot or railroad engineer. Moreover, the doubtful, as well as all the cases found, can be referred to the specialist for decision. This test, as you will see, requires the examined to make a muscular effort to do something, which something exposes him to the expert, who understands what it means. From the want of such a test color-blindness has escaped detection. In expert hands it is so applicable that thousands have been tested in the time that it took formerly to test tens, and with more certainty. We shall see that it calls

for no knowledge or education on the part of the examined, no knowledge of colors or their names; they, in fact, need never have seen a color. A mutual language is unnecessary. Examiner and examined may be both deaf and dumb, as the former may pantomime the latter what to do, &c. No color names are spoken.

Holmgren's worsted test is, as you see, a collection of little skeins of worsted of definitely chosen colors. The skeins must be alike in size and shape. I have seen collections of worsteds sold as Holmgren's in which the false colors were of a different material, so that the color-blind employé or pilot, "coached" by his friends to pass the examination, would very readily recognize them by their difference in material, and thus escape detection. There are some 150 of these little skeins, in order to give the examinee's brain "elbow room," so to speak, to exhibit his defect. They are loosely heaped upon a white cloth, and three or four feet to one side is placed the test skein of a peculiar green hue, which corresponds to that portion of the spectrum where the color-blind begins to fail to see color. The examined is asked to pick out of the heap those skeins which look like the test of that color, lighter or darker. No color names are to be used. The examiner can do it for him over and over again if necessary, while all the others to be tested can stand around and look on. The normal-eyed learn thereby to go through the test more quickly and the color-blind get nothing that will help them, as the worsteds are mixed up again each time. According to the intelligence of the examinee he of course more or less quickly selects the various shades of green to throw down by the test worsted. The expert as quickly decides his case thereby. This is the whole story, and nothing more is needed to prove his chromatic sense to be normal. We are seeking only to find this out and not decide whether his color sense has been cultivated. There is no matching, or shading, or asking names, or any color knowledge required. All the nonsense in the newspapers about this are the falsehoods published by those interested or hired to prevent any examinations for color-blindness on the railroads, with the hope of obtaining the employés' votes, &c.

Now, suppose the examined *is* color blind, what will he do? His mistakes are always most characteristic. They must, however, be thoroughly understood by the examiner to enable him to give a correct decision. They are illustrated in the colored plate in my manual. The series of colored skeins hung up on the card side of the green test shows them still better. They run from simple gray through stone color to browns and even red, the complement of the test. The color-blind person throws these or some of them down with the same confidence as we do the correct colors, and his defect is instantly exposed. Such a person is dangerous in reading or giving colored signals on land or sea. Proper tests with flags and lanterns will always prove this. But the best experts would have to spend hours with flags and lanterns to decide on

the defect, even laying aside what it is impossible to do, viz, guessing and collusion.

A further test of the color-blind will confirm our decision and also tell us whether the examined is *green* or *red* blind. This is, of course, of no consequence practically, as one involves the other. We remove the green test and put in its place a shade of purple. To this the red-blind places *blues* and the green-blind *grays* and *greens*, the strength of the colors selected varying with the amount of the defect. At the side of the test skein, hung upon the card, are the false colors chosen by the red- and green-blind.

The third test skein is red, like the railroad flags, of value to exhibit the defects still further to officials. On the card you see beside it the browns and greens the color-blind match to it, just as illustrated by the colored plate in my manual.

It very likely seems scarcely possible that after all you have read in the newspapers about testing, &c., it should be thus proved to you as so simple and practical. It must be remembered that the defective do not want to be detected. They and their friends are ready to do or say anything to prevent it. Of course none of this sort of difficulty exists as to testing in the schools. My experience urges me to warn you as to the selection of worsteds to use. The tests, three in number, should always be larger skeins than the others, so as not to be mistaken. I have seen tags marked "Test" put on any of the worsteds in sets offered for sale. Having no pecuniary interest in the sale of proper collections, I will quote from the dealers' circular for your benefit:

The value of the test depends upon its being carried out strictly in accordance with Professor Holmgren's directions, given in Dr. Jeffries's manual. For this purpose it is absolutely necessary to have the *correct colors and shades of worsteds,* which are not easily procured; therefore, at the meeting of the American Ophthalmological Society, at Newport, July 25, 1879, it was —

Resolved, That Dr. B. Joy Jeffries be requested to make such arrangements as he may find practicable to enable the members of the society and others to procure suitable collections of colored worsteds for testing for color-blindness.

In compliance with this request the following arrangement has been made with the undersigned. They agree on the receipt of $2.50 to send by mail, post paid, to any address, a complete and accurate set of worsteds, including the *tests* selected by Dr. Jeffries. On the receipt of $4.50 they agree to send, post-paid, to any address, a set of worsteds and the manual of Dr. Jeffries above referred to.

N. D. WHITNEY & CO.,
129 *Tremont Street, Boston, Mass.*

Several imitations of Holmgren's test have been devised, but none of them compares with the original presented to you. There are also other methods of detecting color-blindness which can be used by experts, not, however, with the rapidity and certainty this comparison method with the worsteds allows.

PRACTICAL RESULTS FROM TESTING FOR COLOR-BLINDNESS.

Aside from detecting the 4 per cent. who are color-blind, it will now be asked, What relation has this testing to the question of the education of the normal color-sense? A very practical one. All expert examiners in different parts of the world have found and shown a hitherto unknown and unrecognized ignorance of colors and color names on the part of males, adults as well as children, educated and uneducated. There has been a universal agreement on this point. It explains the constant dispute among even adults as to the colors before them. This ignorance has been curiously mistaken for defective chromatic sense. Such mistake could not have occurred with proper methods of testing. I find that it still shows itself here and there among teachers and educators. An explanation of its origin becomes, therefore, quite necessary, which I said I would defer to this point. I would call your attention to the

INCURABILITY OF CONGENITAL COLOR-BLINDNESS.

As most probably one male out of every twenty-five in the community is more or less color-blind, and as, besides the mortification or restricted sphere of employment this may entail, our lives and property are thereby endangered on railroads and vessels, the question of the curability of congenital color-blindness is one of considerable importance. Certainly the color-blind railroad employé or pilot should not be dismissed from service if he can be cured of his defect.

It has been till lately universally admitted by ophthalmic surgeons and physiologists that congenital color-blindness was incurable by any known means. In August, 1874, Dr. A. Favre, of Lyons, France, reported to the French Congress for the Advancement of Science, at Lille, some observations which seemed to him to prove that congenital color-blindness was curable both in children and adults by exercising the chromatic sense.[1]

He reports the results in eleven different schools of the examination of 1,002 boys between the ages of four and fifteen. These their teachers tested by asking them to name the color of objects exhibited of five principal colors. The teachers reported to Dr. Favre that they found at least 218 defective in chromatic sense, and that almost all were perfectly cured by being repeatedly shown objects and told the names of their colors till they were learned. Among 138 girls, from seven to fourteen years of age, Dr. Favre himself found only two whom he regarded as color-blind. These girls, he remarks, were under excellent teachers, and a large number had passed through the salles d'asile, where colors were taught.

Dr. Favre then says:

The examination of these several reports shows that many children of both sexes come into the salles d'asile and schools without a notion of the elementary colors. The

[1] Le Traitement du daltonisme dans les écoles. Par A. Favre. Lyon. 1877.

number of children lacking in this sensation in the majority of boys' schools I have visited is from 20 to 30 per cent. This ratio diminishes in proportion as the attention of the scholars is directed by their teachers to colored objects. Certain exercises, the painting of plans, geographical cards, lessons in natural history, &c., have an evident influence on the scholars' progress in this sense. Among the girls, sewing work, embroidery, the care of the clothing, the handling of flowers, much reduces at eight years of age the number of those who have difficulty in distinguishing one or more of the elementary colors. At this age the number of boys who make marked mistakes in naming colors is still quite large, and we have found that, if the majority easily acquire a knowledge of colors, many of these need watchful and continued care, requiring to be examined periodically, so to speak, till we are assured of their cure. What is the best method to use in the schools? Experience may teach us further, but from our observations during the last five years we feel authorized to draw the following conclusions: Male and female teachers should be required: (1) To question, separately, the scholars of their class as to the five elementary colors, and also as to white and black. (2) To carefully record at the time of examination the scholar's replies against his name. (3) The scholars who have made mistakes should be individually called twice a week and the colors named before them; they should be questioned and taught till it is shown that they have acquired an exact notion of the elementary colors. (4) There should be periodic examinations. (5) Whenever occasion presents, the precise names of colored objects exhibited should be spoken before the whole class. (6) An advanced course on colors should be given scholars destined for special professions, by the aid of Chevreuil's color chart and the most commonly manufactured articles.

The treatment of color-blindness in the adult has also given us very conclusive results, which we have embraced in an unpublished article presented to the Academy of Science.

Dr. Favre says again, elsewhere:[1]

I call for the introduction of exercises with colors in all the schools, in the army, in the navy, and on the railroads. I am persuaded that by the precautions I have indicated a great number of accidents may be avoided, and I hope to be so fortunate as to cause congenital Daltonism to be stricken from the nosological list.

Dr. Favre has here undoubtedly mistaken the lack of knowledge of the name of a color for a lack of perception of the color. In this mistake he has been confirmed by the rather extraordinary reports from his several friends who were teachers. These latter, I must at once insist, were wholly incompetent to decide whether their scholars were color-blind. We must, of course, first positively prove the existence of the defect before we can talk about having cured it. It is next to impossible for even an expert to decide whether a child is color-blind by simply asking him to name the color of pieces of paper or other objects. It is, on the other hand, very possible to teach him a name which he shall attach to the object, as it would also be to teach a congenital blind person. These children, supposed color-blind, are reported as cured by more or less exercise with colors, according to their individual quickness and memory in catching and retaining their names. Those that were dull, inattentive, and forgetful required repeated exercises before

[1] Résumé des mémoires sur le daltonisme présentés à l'Académie des sciences. A. Favre. 1875.

they retained the names of colors which were seemingly readily forgotten. This is perfectly shown by the teachers' reports.

The reported percentage of defective color perception found would of itself throw much doubt on the method of testing. For instance, as many as thirty out of fifty and fifteen out of thirty-five children are reported having "no notion of color." But 10 per cent. is a very large ratio, even when we include all cases of only slight color-blindness. Now, these children were from four to fifteen years of age. How many school boys at this time of life know the names of five colors, or, having heard them, will apply them correctly when questioned, without being specially taught? We find it very different with girls, as did Dr. Favre. They use the names of colors much more frequently, and have more to do with colored objects in dress, trimmings, &c.

Those of us who possess normal color perception know how difficult it is to tell the difference between light greens and blues. This formed a large class among these supposed defective children, and they were reported cured in four or five exercises. A further convincing proof of the inadeqnacy of the test employed, and of the disqualification of the teachers as examiners, is shown by their reporting children as confounding those colors which the color-blind never do; for example, red and violet. I would not, of course, deny that among these thousand children there were any color-blind. Proof to the contrary exists in the statement of one teacher, who says: "I sometimes despaired of curing one child, six and a half years old, who, after sixty-five exercises, could not tell me a single color without hesitation. Eleven exercises more, however, cured this unexampled Daltonean, who began by first distinguishing green and finished by not always calling red yellow when shown him." This child no doubt was color-blind and took this length of time to learn the name of a color, to be repeated whenever the same object was shown him. If alive, this boy is as color-blind now as then, I am certain, and any test not calling for the use of names would undoubtedly prove it. Professor Helmholtz, in his Physiological Optics (page 299, 1867), said:

> As to the examination of the color-blind, simply asking them to name this or that color will naturally elicit but very little, since they are then forced to apply the system of names adapted to normal perception to their own perception, for which it is not adapted. It is not only not adapted because it contains too many names, but in the series of spectral colors *we* designate differences of tone as such, which to the color-blind are only variations of saturation or luminosity. It is more than doubtful whether what they call yellow and blue correspond to our yellow and blue.

The lack of practical value of tests for color-blindness which require the examined to name colors has been well shown these last two years in the search for defective color perception amongst the personnel of the armies, navies, and railroads of Europe. It seems strange that Dr. Favre should have been led to conclude that color-blindness was so frequent as 30 or 40 per cent., or that it was curable by exercise with

colors, since his experience with railroad employés has been very large. He probably was deceived by using with these latter tests calling only for the naming of colors.

At first sight it seems only natural that we should be able to improve our color perception by use, as we may sharpen our other senses by exercise. But in the color-blind there is a congenital defect or deficiency. With the ear we may learn to distinguish sounds whose vibrations come within the range of our scale, but no amount of instruction can make us hear a note above or below the vibratory scale of our ear. A little practice will enable the normal eye to discriminate between the lighter shades of green and blue, which at first it had confounded, but no amount of exercise with colors can cause the color-blind eye to perceive those colors as we do, to whose ethereal wave lengths or numbers it is not adapted. However much practice may cultivate the power of an organ, it can never give that organ a different or additional power. I admit that constant exercise may enable a person only partially color-blind to improve his capacity for discriminating colors, but even then I do not believe he has altered his color perception, but only supplemented it by additional means, as we so often see other senses, when deficient, supplemented. Whether we shall ever be able to cure color-blindness is another question I am not in position to decide. That it cannot be cured or altered by exercise with colors is now so generally understood and admitted that I need not give the authorities in the article I quote from, which I published some few years ago. I then said:

I think the necessity of discussing as far as I have what at first sight seemed perhaps only a medical opinion has now been made apparent. The very mistake Dr. Favre has been led into has also deceived railroad officials who here and there have tested an employé suspected of color-blindness with the flags or lanterns used on their individual roads. It requires considerable argument and positive proof to convince a railroad superintendent that one of his men whom he has had cause to suspect, and has seemingly thoroughly tested, is after all color-blind. It is very difficult for him not to believe his employé has learned, or can be made to learn, to see colors as they appear to a normal eye. He, however, will be convinced against his reason, when the color-blind man is in his presence subjected to a proper scientific test applied by a competent specialist.

These published ideas and mistakes of Dr. Favre have been long ago exploded. But curiously enough they are the ground on which school teachers here and there, when referred to by railroad officials as to the existence of color-blindness, deny it and attribute it all to the lack of color education.

COLOR IGNORANCE A DRAWBACK.

I have naturally found the same ignorance of colors and color names in this country as has been found in Europe. My relation to the subject has shown me equally what a drawback such ignorance is in everyday life. I have received letters from people whose business called for color education which they did not possess, and who besought me to

push on in my endeavors to introduce systematic teaching which does not now exist. The greater use of color within the last ten years, and the greater appreciation of it, and still greater need for its æsthetic application, all combine to call upon those engaged and interested in our manufacturing industries for a much more highly educated chromatic sense. This equally of employed and employer. Moreover, the gradual turning of men to women's work requires that the former shall have the color knowledge of the latter, a knowledge which they get from life-long contact with and use of colored objects in dress and adornments. There is an increasing commercial value in an eye trained in colors which must be remembered by educators. It will add to the value of manual education.

Why do not males discriminate colors and shades as females do? Simply because they are not taught them systematically and they have no opportunities of learning them out of school. The higher the social grade of boys the more they will be found to know of colors and color names from home surroundings. It may be, however, quite as important that the lad who is to seek his living as an artisan should be instructed in colors and color names. The necessary teaching can be carried out with no further time devoted to it than is now wasted in what is considered instruction.

EDUCATION OF THE COLOR SENSE.

One of the greatest observers and teachers in medicine, Prof. R. Virchow, of Berlin, said at the Anthropological Society meeting in July, 1878, that he would urge, repeated in every school term, the practical teaching of colors, for he had found the majority of young men incapable of defining with certainty the finer shades of the most common colors. "It was exceptional that a medical student could tell whether a red shaded into a black, blue, or brown, or whether a yellow shaded into gray, white, or green. This was a lamentable defect of the eye, very seldom dependent on color-blindness, but on ignorance of colors and lack of practice. It can readily be overcome by education."

Thirty years ago it would not have been believed that the present musical teaching in the schools could be carried out. This has been done by *systematic* training, the application of thoroughly practical methods. We cannot make the human ear respond to vibrations above or below those to which it is attuned by nature, yet we can teach this ear to differentiate and distinguish between the several vibrations within this range. This has now been incorporated as a part of the child's education. Systematic methods have done wonders in the education of the voice. What was formerly impossible is now readily carried out in our schools.

Scientifically systematic methods introduced into the teaching of drawing have done as great or greater wonders. I agree in the statement that Mr. Walter Smith "was an Agassiz among us." What I have seen

on the school blackboards in the way of free hand drawing by Mr. Smith's methods made me envy the skill the children had obtained by this gradual development of their inherent power. I was taught drawing in the Public Latin School of Boston, but in a way that was almost an entire waste of time from the lack of a systematic method. That teaching has been of little or no use to me since. Such teaching as is now given would have been of great value to me, as it will be to these children hereafter. It also, as music, has been incorporated into our public school instruction and life.

How, now, about our other ocular sense, color? Mr. Walter Smith told me that he never attempted the introduction of color in public teaching. Color-blindness he was a stranger to, being as astonished as others at the results of my tests in the school his own children were attending. I may almost say that there is no teaching of color in our schools. What we have is rather the attempted teaching of color names. The sense of color has been almost totally neglected. That it can be equally taught and educated there is abundant proof of in the extraordinary delicacy of the sense attained by so many workmen in colored fabrics, &c., mosaic setters, and the like. I do not mean that systematic and methodical education will develop the sense in the individual beyond its natural power, but that such teaching will enable the eye to discriminate within its range, as does the ear within its range, &c. On the other hand, I would not deny that generations of teaching may heighten the color-sense and render it more acute. No teaching will alter color-blindness.

TEACHING COLORS.

Naturally enough, perhaps, no methods heretofore used of teaching colors, charts, cards, &c., have taken into consideration the chromatic defect which exists in 4 per cent. of boys. And by none of these methods has it ever been detected. In a public primary school where color was being taught in the best known way and by a good teacher, I found a color-blind boy. He could point out on the color chart there used the color named. It was simply a locality to him. A square in a certain place on the chart corresponded to a remembered name. Change its color and he would still point to it. Here has been the mistake. Then, too, red, yellow, and blue have been taught as the primary colors, as I have before explained. A large number of curious mixtures of colors have been placed on the charts, with their commercial names attached. From all these the children have no more learned colors than I learned the power of the pencil in attempting to make a picture.

Nothing can be accomplished in color-teaching till the mistakes of the past are understood, admitted, and corrected. The very means adopted have but helped to blind the teacher and the educator in the belief that colors were being taught when in reality nothing but names associated with certain objects were being remembered. It is very true

that many a teacher, disgusted with the charts, blocks, cards, &c., placed in her hands, has discarded them all, and gathered together larger or smaller collections of colored paper, worsted, ribbons, &c., but no exercise with these has revealed the characteristic mistakes of the color-blind boys she has taught. I have detected color-blindness among the best taught classes. I have witnessed the best color-teaching, and there was really nothing in it which would inevitably detect a defect of the color-sense. It would not have astonished me at all to find on trial one of the exhibited boys color-blind.

PROPOSED METHOD OF TEACHING COLORS.

I am induced to bring this method before you because it is the result of some years' study and experience. It has been introduced into the public primary schools of Boston and the private Kindergärten after long and patient examination on the part of supervisors, superintendents, and committees, to all of whom I am indebted for criticism and practical suggestions.

Another reason forces me to bring forward this already tried method. At your last meeting Mr. Newell referred, as one of the chief obstacles to successful results in the schools, to "the destructive criticism that meets us in our newspapers and in some of our periodicals and other publications," the kind of criticism which says "this is all wrong" and never gives you a hint how to make it right.

Now, I delayed calling attention to the dangers of defective vision on land and sea till I could present methods of detecting defects so simple, practical, and easy of application as to leave no excuse for their non-application. I also did not complain of and show the mistakes of present methods of teaching colors till I had a remedy to present which would meet all my own objections; moreover, which would meet the natural objections to all change, namely, lack of time and opportunity. If one-half or two-thirds of the time now granted color-teaching, which apparently at present ends in nothing, should be devoted to simple systematic instruction with the proper appliances, the foundation of the education of the color-sense will have been laid on which higher education can be built.

COLOR CHART ADOPTED BY BOSTON SCHOOL BOARD.

I long ago recognized the ignorance of color names and lack of appreciation of colors and endeavored to work out some method of teaching which would be practical and easily assimilated in our present school system. From reasons which I have placed before you, I soon became convinced that any plan to be successful must be based on the principle of comparison, by which alone we get hold of the effect of color on the brain itself. My experience showed me why the means hitherto adopted in the schools had failed, and I readily understood why intelligent teachers had dropped them as useless, and why they

were always so interested in what I had to show and say about systematic methods based on the true principle of comparison. I contrived certain plans and saw what others had also contrived. None met the wants which my experience in the schools called for so well as the color chart of Prof. Hugo Magnus, of Breslau, which was awarded an honorary diploma at the International Medical Congress at Amsterdam in 1879. He reached the solution through exactly the same training I had passed through, viz, continued work in testing and studying the color-sense in the schools. It has much interested me to see how well this method has been spoken of by the experts in Europe who were best competent to judge, viz, those who had found out from personal experience in examining the defects existing and the special needs in any color-teaching. Through the coöperation of Mr. L. Prang, I have finally succeeded in producing an enlarged arrangement of Magnus's chart better adapted for our purposes, and added a teacher's manual explanatory of the

METHOD OF USING THE COLOR CHART AND CARDS.

You see on the color-chart, arranged in nine rows from left to right, the following colors: brown, crimson, red, orange, yellow, green, blue, violet, gray. Each is represented in five tones, commencing with a light one and passing through three more saturated tones to a quite dark one. The middle horizontal row is intended to represent the typical or standard colors. Above are two lighter *tints* and below two darker *shades*. Each oval on the chart is represented in duplicate in the accompanying oval colored cards. The chart is hung up and the cards distributed to the children, who are told to match their cards against the same color on the chart. No names need be at first used. Or the cards may be distributed and a child asked to find in another's hand his corresponding card, &c. The teacher's ingenuity will suggest various ways, on this principle, of keeping the children's interest till they learn to recognize each typical color, &c. The names need not be used and need not be refused when asked for at first. Next, similar exercises should be continued when the name is always used by teacher and child. Later, attention can be drawn as to how the tints and shades of any color are related, how white makes it lighter and black darker, &c. Afterwards the names of these various tones may be entered into and taught and their occurrence noticed in objects of every-day life; for instance, the several tints and shades of blue in well known flowers, in worsted, bits of ribbon, paper, &c. The time necessary will of course depend on the scholars' intelligence and their home familiarity with colors.

Care must be taken that the child has really learned the color, that is, feels its force and connects the name with this feeling, and does not simply connect the name with a certain oval on the chart. This latter, of course, the color-blind child can do. This cannot occur if the teacher

follows the directions for the use of the chart given in the manual accompanying it.

Simple as this method will seem to the female teachers, they are again warned that the boys will appear very stupid compared to the girls and quite ignorant as to color names. A very intelligent and experienced Kindergarten teacher asked me if my own boy of five years was not color-blind, because he could not name the colors of the colored squares pasted on a card in a row to represent the spectrum. I replied that I had tested him with the worsted when he was four, and when five he amused himself helping me test railroad employés with the worsteds. But officials of all kinds, commissioners, &c., have fallen into similar mistakes in their ludicrous attempts to ascertain employés' color sense.

THE COLOR-CHART DETECTS COLOR-BLINDNESS.

In the use of this chart a color-blind boy will, sooner or later, make such characteristic mistakes as to call the teacher's attention to him. The charts and the cards are, as you see, somewhat like the use of the worsteds. The color-blind mistakes are described in the teacher's manual. You have seen what mistakes of matching they will make. Thus the chart, being based on the principle of comparison, will serve the purpose of teaching colors and color names and the probable detection of color-blindness. Such teaching will be a new era and the first commencement of systematic color teaching. Upon it, as experience unfolds the needs and necessities, can be built up in the future the whole fabric of advanced color teaching, and that will in the future educate the color sense within its present power of education. Whether generations of color teaching will finally alter the chromatic sense in males, and thereby reduce the proportion of color-blindness in that sex, it is certainly at present useless to affirm or deny. It is with no such idea that this chart has been introduced in our Boston schools. It is not introduced with the idea of detecting color-blindness by it. It has been found a very simple and practical method, based on the true principle of comparison, which, in practical use, will most probably, as no methods ever have, warn the teacher of a child's chromatic defect when present. With it, in every school where it is used, should be a type set of Holmgren's worsteds and the manual adopted by the United States for medical officers of the Army, Navy, and Marine Hospital Service, as also by the Pennsylvania Railroad. To answer inquiry I would say that they can all be obtained of the Prang Educational Company of Boston. My manual I recommend because there is no other in English and it will be invaluable to the primary or grammar teacher or superintendent as a book of reference. In most of the primary schools of the large cities of this country are already collections of worsteds, ribbons, paper, &c., costing much more than a type set of correct worsteds, now readily obtainable. This type set will also serve for the object teaching as now conducted.

PRIMARY COLOR LESSONS.

I take great pleasure in advocating and calling your attention to the Lessons on Color in Primary Schools, by Miss Lucretia Crocker, one of the Boston school supervisors. In her descriptive pamphlet, published by S. R. Winchell, Chicago, she has carefully laid out the work for each year by thorough explanation to the teacher. She uses the colored pieces corresponding to those on my chart, which are ample, viz, five shades of nine colors. By these she shows how both form and color may be taught together. This color chart and her plans are also as well adapted to Kindergarten work.

TECHNICAL AND OTHER DIFFICULTIES.

Committees and educators cannot expect medical experts to do as I did, viz, test, without remuneration, some twenty-nine thousand school children. Hence, the value of instruction which leads to the detection of the color-blind boys is a pretty important point of practical value. I found in Savannah two brothers color-blind. Their father was a pilot, whose occupation United States law would prevent them from following. In Boston I found color-blind boys whose fathers were locomotive engineers. Their ambition was to follow that calling, which the law forbids. A color-blind boy kept away during my tests in one of the schools. His brother I detected. The former went into the Institute of Technology, where in the second year he failed in chemistry, which he had chosen as his profession, which, without a normal-eyed person by the side of him to refer to, he could not follow. Besides all this, the school teacher cannot change the child's color sense, and hence must know who are to be let alone as defective.

I will answer the questions which some of the members have put to me by explaining the technical difficulties with this or any color chart. If any one will watch the labor expended on Mr. Prang's Christmas cards, he can form some idea of what it costs to prepare one of these charts with forty-five different shades, each of which must be exact and exactly matched by the accompanying cards. A little general variation in even the finest chromos is not important, but this is not allowable with a color chart on the principle of comparison. There are great technical difficulties in producing it perfect. One might readily suppose that colored paper could be selected and pasted on the chart. This was found to be utterly impossible. At first we supposed that our color choice might be above the little children's comprehension; that we were asking too much of their power of comparison in colors. To our surprise it has turned out quite the reverse, and the children of four to six fail to match the cards to the ovals on the chart unless both are exactly alike in color and shade—this to such an extent as to quite preclude attempts to arrange anything with colored papers less expensive.

As to wear and tear. The cards are glazed to prevent rubbing. The

colors on the chart hold extremely well in ordinary light. There is no call to put them in sunlight. Except when in use, they may be covered up.

In conclusion, I would thank the association for this invitation to address them and their interest in my remarks and what I have shown them. If I have attempted to tear down, I have at least attempted to build up something better and truer. In Boston we have laid the first and the corner stone of the future education of the color sense.

SUPPLEMENTARY READING.

Superintendent GEORGE J. LUCKEY, of Pittsburgh, Pa., then read the following paper:

Teachers, like those who follow other occupations, are inclined to move in a groove, to teach as they were taught, to govern as they were governed; and it is only by slow degrees that they are coaxed or driven to adopt new methods of teaching and different plans for governing. It took a full century to drive the spelling book, with its long columns of meaningless words, from the head of the list of school text books; and even yet it finds a revered place in many schools and is affectionately spoken of by some teachers. If the doctrine of the old law were still in force and we were justified in exacting an eye for an eye and a tooth for a tooth and spelling books had feeling, I would consider it my religious duty to chastise the United States spelling book every morning for the bruises that I received a third of a century ago because of my inability to master the orthography of its abominable contents. Those who made spellers never thought of filling them with words in every-day use; but they burned midnight oil in their efforts to fill columns and pages with words of similar sounds, while others were chosen simply because they were composed of a certain number of syllables, and whose orthography the pupil was required to master before he knew their meaning or used them in speaking or writing; in fact, there are many of these words whose countenances I have not seen since we parted at the old log school-house. The result of this method of teaching spelling was that we were compelled to learn, after leaving school, the orthography of many of the words used in common conversation and in ordinary correspondence.

The war against the speller had scarcely ceased, the old educational soldier had but lately laid aside the paraphernalia of war, his pension bills had not been passed, the bad feeling that had been engendered by the late "unpleasantness" had not entirely disappeared, when the struggle was renewed with increased bitterness. The speller had been vanquished, but the enemy concentrated his forces around the reader and the struggle continued with unabated fury. Not being a skilled diplomatist, I hesitate to designate a line of policy to be pursued in the present conflict; but, if given the power, I would direct that there

should be no fighting in detail, but that the attack should be made along the whole line, and that the reader and its allies, the speller and the grammar, as school text books, should be, if possible, entirely destroyed. I cannot find words to describe adequately the folly of the almost universal custom of confining the pupil in his reading to the text book on that subject. Five, six, and seven years of the pupil's life are almost wasted in an effort to learn to read, according to rule, the scraps found in our school reader, while the same time, if properly utilized, would enable him to read the history of every civilized nation and to obtain a good knowledge of the writings of all the best authors of fiction. Imagine, if you can, a ten year old child trying to deliver properly the masterpieces of Webster, Clay, and Calhoun or a girl of twelve summers attempting to enter into the feelings of Demosthenes while addressing the Athenians, and all this before the pupil has read a story of half a dozen pages or is able to read understandingly the current news of the day, and you have a faint conception of what the schools are attempting to do in teaching reading.

In teaching reading our instructors lose sight of the true object to be attained, viz, a comprehension of the thought of the writer; they give too much time to manner, and not enough to matter; they teach how to emphasize by rule, but not how to understand; they give too much time to oral expression, and not enough to mental culture. Pupils trained in many of our schools are able to read whole pages according to rule, and yet are unable to gain a single idea from what has been read. Pupils thus trained look upon books as containing only words, and when leaving school are ignorant of the fact that through the medium of reading they can have as constant companions the wise and good of their own day as well as the illustrious dead of every age and clime. If it is conceded that there is something radically wrong in that system of teaching which fails to create in the pupil a love for books and which is powerless to attract his footsteps toward the quiet haunts of study, we surely must begin to look with suspicion on the method now in use, when we consider how widespread is the unconcern manifested by the children for the acquisition of knowledge or for individual research in the boundless fields of literature that are blossoming all around them.

To my mind the difficulty lies in the fact that we confound reading with elocution, and that the latter has forced the former almost entirely from the course of study; and, unless some change is shortly inaugurated in this particular, the Wendell Phillips of the next century will be compelled to place reading upon the list of "lost arts." The pupil who understands what he reads will require no drill on emphasis, inflection, or facial expression, for it will be given as a natural sequence, unless he has been so long drilled on elocutionary rules that his unnatural expression and monotonous tone have become a part of his nature: and if this is the case his reformation is hopeless. We make no effort to teach our children these things when they are learning to talk, and

yet no boy with a bruised toe ever says "ouch!" without giving the proper emphasis, inflection, and facial expression. We never teach our children that it is improper to laugh when they are sick, or to cry when they are happy, or to look pleased when they are angry, or to feign anger when they are glad; and yet who ever saw a child make a mistake in any of these things? The fact is that all boys and girls, without any teaching, tell their tales of joy or sadness with smiles or tears, and it is only after they have entered school and been taught rules that they become monotonous and unnatural. He who undertakes to teach a child to express well what the child does not understand wastes his energies in a fruitless task to accomplish the impossible, robs the pupil of his golden moments, and changes the spirit of inquiry into a hate of the printed page.

The almost universal custom of limiting the reading of the pupils to the text books on that subject is the monstrous educational heresy of the age. I am willing to concede that the present school reader should have a place in the school room for the purpose of aiding the child in obtaining a knowledge of the orthography and use of words, but I am unwilling that it should monopolize his time and attention throughout his entire school course. I am unwilling that the pupils should be turned from the school doors without having acquired a love for general reading, without knowing books and what is in them, without having made the acquaintance of the good and great whose sayings and doings have come to us through the ages that are past; I am unwilling that they shall have no tried and trusted friends to keep them company around the fireside; I am unwilling that the youth of the land shall leave our schools without the knowledge of companions other than the idle and vicious that throng the alleys and street corners of our cities. What, then, is the change that is needed? Simply the introduction of entertaining and instructive books in place of the present scrap-book readers; feed the growing mind on food that can be mentally digested. In place of the speeches and writings of statesmen and scientists, give him the pleasing stories of Robinson Crusoe, The Swiss Family Robinson, and a child's history of his own and other countries, and thus utilize the time that is now wasted upon drills in emphasis, inflection, and expression. One would think on visiting a public school of to-day that every boy and girl in the nation is being drilled for the stage or the forum, no notice being taken of the fact that not one in a thousand will ever be public readers or speakers. In our efforts to find a royal road to learning we have encouraged the school book publisher to multiply his wares without number. A half century ago we started with the English Reader and the New Testament, and to-day we have charts, primers, first, second, third, fourth, fifth, and sixth readers; and, for fear that the child would find time to read something useful when admitted to the high school, some one has effectually blocked his way by preparing a high school reader. The time has come when these

advanced readers must give place to good books in history and fiction; when our children must not only be taught to read, but must also be taught what to read; for, if a child acquires the ability to read and is not properly directed, his acquirement is more likely to produce evil than good results. When a child has learned to read, the text books in reading should be abandoned and he should at once be encouraged and directed in reading books of stories and travels, and thus cultivate that continuity of thought which is the most important of the mental processes of the scholar.

This acquisition can be best secured by directing the attention to a single subject for an extended period of time, under the pressure of the most energetic concentration of the thinking faculties. If the schools overlook this point of mental culture, their work will be incomplete. This branch of training, however, may more properly be assigned to the highest primary and grammar grades, where history, biography, and carefully selected works of fiction can be comprehended and enjoyed; the reading of this class of books will also create a love for pure thought and a pure style.

If the schools will but do their duty in supplementary reading, the yellow backed, pernicious literature that flaunts its signal of vice from every news-stand would soon be without a purchaser. Is there any one so gifted with imagination that he could picture contentment in the heart of a child while reading the exploits of Dick Turpin, if the same child had revelled for years in the pages of Hume, Macaulay, Bancroft, Addison, Taylor, Abbott, Shakespeare, Scott, and Dickens?

If every school were supplied with a well selected library and if pupils were properly encouraged to spend their evenings in reading, they would, before leaving school, have well defined habits, that would serve as a secure anchorage while passing over life's turbulent sea.

In contemplating the condition of a pupil who has passed through our schools without having learned books and what is in them, we may fitly apply the words of the poet and say:

> But knowledge to his eyes her ample page,
>   Rich with the spoils of time, did ne'er unroll;
> Chill penury repressed his noble rage,
>   And froze the genial current of his soul.

It is painful to reflect that the vast majority of our children, after spending seven or eight years of the best period of their lives in the school room, have never read a book; that all this time has been given to reading disconnected scraps, most of which they were unable to understand, and that they leave school with the idea that books contain only words.

Thomas Jefferson said, when contemplating the institution of slavery, that he trembled for his country when he reflected that "God is just!" I, too, tremble for my country when I reflect that that justice still lives and is the pursuer of all faithless husbandmen in the vineyards of the

world, who bring "nothing but leaves" to the Master's harvest and with sinful prodigality fling away the precious hours of our youth on the barren wastes of fruitless theories and idle speculations.

READING.

Assistant Superintendent CHARLES G. EDWARDS, of Baltimore, said:

One of the wise men of the olden time is reported to have said, "Let me make the songs of the people and I care not who makes their laws." The sentiment would hardly hold good at this time and in this country. We are no longer a singing people. We are not altogether insensible to melody and harmony, but we prefer to do our singing by proxy. We prefer to praise God through the medium of a paid choir; and when we go to the opera we prefer to have the music set to words which, like the heathen Chinee, "we do not understand." There is but one national air set to words of which we need not be ashamed, The Star Spangled Banner, and even the war (I mean the late unpleasantness) developed but one stirring air accompanied by equally stirring words, and this song, Maryland, my Maryland, has the same parentage as The Star Spangled Banner. No, we are not a singing people, and it would profit little that one should have the exclusive right to make our songs. But we are emphatically a reading people, and the old adage might be translated thus: "Let me control the reading of the people and I care not who makes their laws."

There is nothing that strikes the eye of a stranger sooner than this universally diffused reading mania. The milkman who dispenses the chalk and water which is to dilute our matutinal coffee has his newspaper in his lap while he is driving, and during the interval between the ringing of his bell and the appearance of the house servant he is devouring its contents. No man starts upon a journey, if it should be only an hour long, without first stuffing his pockets with newspapers. Of an early morning he may dispense with his breakfast, but the newspaper is indispensable. A Frenchman going on a four-and-twenty-hour trip packs his lunch basket and cigar case; an American lays in an extra supply of newspapers and half a dozen numbers of the Franklin Square Library. But if he should be so hard pushed for time or space as to be unable to lay in a due supply, the railway company, taking compassion on him, sends a boy through the car once every five minutes with newspapers and dime novels alternately with gum drops and prize candy. We are emphatically, and we will continue to be, a nation of readers; and it is of the utmost importance that we answer rightly the question "What shall we read?" We need not trouble ourselves at present with the question "What do we read?" The answer is to be had in the records of any of our circulating libraries, which show that the demand for sound and sensible literature bears about the same ratio

to the call for trivial and sensational pamphlets as did Falstaff's poor pennyworth of bread to his intolerable quantity of sack.

How can teachers control and direct the reading of their pupils? How can they persuade them to buy more "bread" and less "sack"? Let us acknowledge at the outset that the minds of the young cannot be entirely "controlled" and can only be to a limited extent "directed." The intellectual appetite, like the physical appetite, varies with the temperament of different individuals and varies in the same individual at different ages. "Jack Sprat," we are told in the nursery rhyme, "could eat no fat; his wife could eat no lean." So one child cannot endure poetry and another cannot abide history. Every young man remembers his boyish devotion to molasses candy and every young woman can recall, with a shudder, her girlish attachment to pickled cucumbers. I do not know that a moderate indulgence in sweet candy or sour pickles, at the age when such things are craved by the young, will do much harm, provided the sweets and sours are honestly made from honest materials. You may be reasonably sure that boys and girls of tender age will always relish nursery rhymes and fairy tales and stories of travel and adventure, and it will hardly be safe to ignore this prompting of nature. What the teacher has to do is to watch for the time when such honest literature begins to pall upon the taste, and at the right moment to direct the appetite to something better and stronger and more nutritious. In this effort we have one great encouragement: no man who has once tasted good food or good wine or even good tobacco ever turns voluntarily to an inferior article. So no child who has once tasted the sweets of pure and ennobling literature will ever turn to drink from the polluted streams of sensational abominations. It is the duty, then, of the teacher to lead his pupils gently and lovingly into the green pastures and by the quiet waters of standard English, in order to save him from any temptation to wander in forbidden paths and quench his thirst in poisoned pools.

Two common errors may here be noticed. It is too much the habit of many teachers to confine their teaching of reading to the outward and material part of the exercise, to the neglect of the inward and spiritual. If the words are rightly pronounced, the pauses properly made, the emphasis duly regulated, the intonations properly managed, these teachers think they have secured good reading; and yet the first and most important element has received no attention, namely, the ability to comprehend what has been read. It is assumed that the chief problem before the teacher is to enable the pupil to read aloud for the instruction of others, whereas the great task is really to teach the pupil to read silently for his own improvement. A very small number of readers are ever called on to exercise their talents for the benefit of others, but every one who has arrived at the years of discretion has every day to exercise this gift of reading for his own instruction. Through a failure to attend to this most essential department of the complex art of read-

ing, many pupils acquire the habit of naming words correctly and grouping them into proper combinations in phrases and sentences without attaching any distinct and definite meaning to what they have read. Consequently, when a new English book is put into their hands, it is to them almost as much of a mystery as if it were written in one of the dead languages. They are obliged to translate as they go along slowly and with difficulty, and they finally grow weary of the effort and betake themselves to something that can be read without labor.

The remedy is to take care that nothing is read that is not fully comprehended, and to devote more time to the development of the meaning than to the correct utterance of the words. Elocution is a pleasing accomplishment, but to be useful it must be based on a thorough comprehension of the subject matter.

The other mistake is not so much in the power of teachers to remedy. The makers of our reading books seem afraid to place plain, strong, nervous English before the young readers, and they devote much of their space to weak, silly, and goody-goody stories and sketches. The Sunday school book makers are even more culpable in this respect than their brethren of the secular press. It would almost seem as if both parties were striving to write down to the lowest grades of intelligence, rather than by placing proper examples before the minds of the young to elevate them to a higher plane of knowledge. The remedy would seem to be the multiplication of reading books; not the serial readers of the schools, but standard works in English literature, for the purpose of concentrating the attention of the pupils rather on the matter than the manner of their reading.

It is worthy of remark that the passion for novel reading is an acquired rather than a natural taste, and, like the habit of using tobacco, if not formed in early life, is rarely acquired in later years. If, then, the time of the young is so fully occupied with that which is worthy of their attention that they have not leisure for light reading, the critical period may be passed over in comparative safety. And as a man of mature years may learn to smoke a cigar, and perhaps even to enjoy its flavor, without the slightest risk of becoming a confirmed smoker, so, after the first heats of youth have been passed without the stimulus of sensational fiction, riper years may bring the power of enjoying a good novel without the temptation to excessive indulgence.

This brief statement would be very imperfect if I did not allude to the wholesome effect produced by having short passages from our best writers in prose and poetry memorized and recited by the pupils. The teacher must be careful that the selections are properly adapted to the age and advancement of the pupils. Care must also be taken to insure a thorough comprehension of every passage that is memorized. This being done, the pupil will have at the end of his school days a choice collection of gems of literature, which will serve him for many

years as models of diction and help to elevate his taste and purify his models.

"Reading," says Lord Bacon, "maketh a full man." But some men read much and are filled only with wind. They have bad digestion, and in place of getting nourishment from their reading they get only pains. It is the art of extracting mental nutriment from the reading that teachers should principally teach. An old writer, whose name I have forgotten, says that some men devour many books and yet are as lean in regard to all true learning as were Pharaoh's lean kine after they had devoured the fat ones. Let the great object of the teacher, then, be to help his young pupils to grow fat on what they read.

Superintendent J. O. WILSON, of Washington, read the following paper on the same subject:

Dr. Johnson used to advise young people never to be without a book in their pocket, to be read at by-times when they had nothing else to do. "It has been by that means," said he one day to a boy at Mrs. Thrales's, "that all my knowledge has been gained, except what I have picked up by running about the world with my wits ready to observe and my tongue ready to talk."

"A man ought to read just as inclination leads him; for what he reads as a task will do him little good."

"I would put a child into a library where no unfit books are, and let him read at his choice."

I have quoted these sayings of Dr. Samuel Johnson about reading as suggesting three points worthy of consideration: First, the importance of reading as a factor in education; second, the necessity of improving the "by-times" if we would make the most of this means of education; third, the propriety of consulting an intelligent inclination in selecting books to be read, and of providing for the use of children fit books and limiting their choice to these.

Educators have given considerable attention to this subject during the past few years, and progress has been made. Lists of suitable books, carefully prepared by several very competent parties, have been published; plans for using books from the public libraries have been made and carried out successfully; and other steps have been taken. But, taking into view the great body of youth and number of schools in the whole country, a great work remains still to be done.

In the city of Washington two years ago there was no provision whatever for regulating or furnishing general reading for school children. There was, as there is now, no public library, and there were no school libraries. When boys were discovered furtively reading Billy the Kid, The James Boys, Dick Deadeye, et cetera, which they had bought complete for 5 cents or borrowed from an obliging companion, the books were duly confiscated and an appropriate lecture was administered; but no better books were furnished in their stead with which the natural

and commendable desire for reading might be satisfied. There were no funds appropriated for the use of the schools that could be applied to the purchase of books for general reading.

Relying on the maxim "The gods help those who help themselves," it was determined to make an effort within the schools to supply this very evident want in our educational facilities.

By gifts of books and by purchases made with funds derived from musical and literary entertainments given by the schools and liberally patronized by the public, an excellent library of between three and four thousand volumes was soon provided for the high school. The course of study for this school looks to a free and constant use of these books by the pupils, and a syllabus to instruct and aid them has been prepared and published. To keep the library in its present good condition and also to increase the number of volumes from time to time, each pupil who is able to do so pays a small annual fee for its use.

Nothing was done until the beginning of the present school year towards providing suitable reading for pupils in grades below the high school. On the 20th of October last, by invitation, Mr. A. R. Spofford, the well known Librarian of Congress, delivered a most valuable address to the teachers on the topics "What to read, when to read, and how to read." This address was replete with the best thoughts and practical suggestions of a master in his profession, thoroughly versed in books and the best methods of reading. The teachers received it with great favor, and by unanimous vote had it printed for their own use. It awakened enthusiasm and furnished valuable instruction. The publication of it by the press of the city also created a general public interest in the subject.

At the close of the address, a brief statement of a plan for furnishing books and guiding the reading of pupils was made to the teachers, as follows:

(1) A list of good books in the several departments of literature to be prepared and published to aid teachers in making selections.

(2) Teachers to make themselves familiar with the books to be read by their pupils.

(3) A small library to be formed in each school where the pupils are old enough to engage in general reading, the term *school*, as here used, signifying the pupils in charge of one teacher.

(4) Each school to constitute a library association and, with the advice and consent of the teacher, to manage its own affairs.

(5) The pupils, with the assistance and advice of the teacher, to arrange for procuring books and a bookcase, to appoint a librarian and any other officer needed, and to make a catalogue and necessary regulations for the use and preservation of the library.

(6) Books to be obtained at first by loans and donations from pupils and others and by purchases as fast as means will allow.

(7) The boys to be induced to give up their cigarettes, the girls to forego some of their small luxuries, and each to contribute the money so saved to the library; also, to be encouraged to earn money for this purpose.

It was suggested that there were a large number of boys and girls who could and would gladly, with the approbation of their parents, aid the new enterprise.

The library was to be for the use and benefit of all, whether contributors or not.

The reports of progress made to the end of January last, covering a period of about three months, show the following:

Number of libraries formed	212
Number of books loaned	6,600
Number of books donated and purchased	3,576
Total number of books	10,176
Average number of books to each library	48

A large majority of the books have been well selected, and as the work goes on those not so desirable will be replaced by better ones.

In carrying out this plan it is essential that teachers shall be well acquainted with the best books in each department of literature. They are to guide and instruct their pupils, and the successful performance of these duties requires a thorough knowledge of good literature, and especially of that contained in their libraries.

It will require time, thought, observation, conference, and experience to develop the best methods of making use of these libraries. At present many of the teachers have set apart a portion of time each week for a talk about what has been and is to be read. Pupils give an account of the books they have read, express their opinions of them, and recite passages from them. Some provide themselves with note books, in which they record the name of each book they have read, its character and purpose, a brief outline of its contents, and passages which have impressed or pleased them most.

When we have done all we can do in the line I have indicated, we shall still need a city library, and we earnestly hope that our efforts in behalf of better reading for the children in the public schools will hasten its establishment. It is needed for the use of teachers, of the large number of youth not enrolled in the public schools, and of the community in general. This is the time and opportunity for some Peabody to lead in founding an institution in the capital city of the nation which will meet with the applause of all its present citizens and the gratitude of coming generations.

The subject of reading was briefly discussed by General RUGGLES, and Mr. SALISBURY followed, expressing entire sympathy with the views presented by Mr. Luckey.

Hon. ALBERT S. WILLIS, chairman of the Committee on Education and Labor of the House of Representatives, delivered a short address on national aid to education, which was listened to with close attention and warmly applauded.

Dr. ORR presented a statement with reference to the work of the committee on legislation and Mr. BICKNELL urged members of the Department to take life membership in the National Educational Association.

The meeting then adjourned.

The evening of the closing of the session was spent socially in the rooms of the Bureau of Education. The guests were received by Hon. Henry M. Teller, Secretary of the Interior, and Mrs. Teller. Some of the members of the Senate and House and other distinguished ladies and gentlemen then in Washington were present. The superintendents were especially interested in learning of the various classes of educational work going forward in the several divisions of the Bureau.

CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 5—1884.

SUGGESTIONS RESPECTING THE EDUCATIONAL EXHIBIT AT THE WORLD'S INDUSTRIAL AND COTTON CENTENNIAL EXPOSITION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

CONTENTS

LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., July 29, 1884.

SIR: The demand is very great and pressing for information with respect to the educational exhibit at the World's Industrial and Cotton Centennial Exposition at New Orleans in 1884. As the best means of meeting this demand, I recommend the accompanying papers for publication.

Very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

Publication approved.

M. L. JOSLYN,
Acting Secretary.

SUGGESTIONS RESPECTING THE PREPARATION OF EDUCATIONAL EXHIBITS FOR THE WORLD'S INDUSTRIAL AND COTTON CENTENNIAL EXPOSITION; REPORTED BY A COMMITTEE OF THE NATIONAL EDUCATIONAL ASSOCIATION.

INTRODUCTION.

Every friend of education in the United States who has observed intelligently has had evidence of the benefits to education from the exhibition of the condition, progress, and appliances of instruction at Philadelphia in 1876. The advantages of pedagogical museums are daily finding increasing illustrations. They are important factors in all great forward movements for the intelligence of the people. The Health Exhibition in London, England, now in progress, with a division embracing the hygiene of education, has a pedagogical exhibit of rare value attracting great attention. It is a matter of profound regret that this Bureau, as the national agent to act in such a case in behalf of the educators of the country, was unprovided by Congress with the necessary means, but the World's Industrial and Cotton Centennial Exposition to open in New Orleans December 1 is within our own borders, and a small pecuniary provision has been made for this Office in the appropriation for the Department of the Interior, of which it is a Bureau. The director general, Maj. E. A. Burke, and his associates in the management of the Exposition manifest a most earnest purpose to give education a place of prominence. They solicit in every way the coöperation of the educators of the country and of the world. To their urgency there was a hearty response at a meeting of the Department of Superintendence of the National Educational Association held in Washington in February, 1884, when a committee, consisting of Hon. G. J. Orr, State school commissioner, Georgia; Hon. H. Clay Armstrong, State superintendent of education, Alabama; Hon. W. O. Rogers, superintendent of schools, New Orleans, La.; Hon. Aaron Gove, superintendent of schools, Denver, Colo.; Hon. J. H. Smart, president of Purdue University, La Fayette, Ind.; Hon. T. W. Bicknell, Boston, Mass., president of the National Educational Association; and Hon. B. L. Butcher, State superintendent of free schools, West Virginia, and president of the Department of Superintendence, was appointed to advise with the Commissioner of Education and to coöperate with this Office in preparing for the exhibition of the education of the United States.

This Office has endeavored to answer as far as possible all inquiries on the subject, and in May published a preliminary circular giving the

information then available. At the great meeting of teachers (numbering, it is estimated, 6,000) at Madison, Wis., this month, Major Burke was present and explained to one of the assemblies the plans and progress of the Exposition to the great satisfaction of those who heard him. Among other things he called attention to transportation, respecting which the following extract from a letter by Major Burke is added:

All are familiar with the facilities of water communication with New Orleans, by ocean, gulf, and river. It may be added that before the opening of the exposition we shall have six railroads terminating in the city, two on the west and four on the east side of the river. Another important assurance of a large attendance is the low transportation rates already secured. These low rates, already secured by written agreements with railroad companies extending over the United States and into Canada, must exert a great influence in nationalizing the Exposition. The rate of 1 cent per mile will make the fare from —

Halifax	$22 91	St. Paul	$12 91
Montreal	17 14	Detroit	10 87
Boston	15 65	Chicago	9 15
New York	13 31	Cincinnati	8 25
Philadelphia	12 41	Louisville	7 41
Baltimore	11 43	Portland, Oreg	32 02
Washington	11 03	San Francisco	24 49
Richmond	10 45	Denver, Colo	15 20
Winnipeg, Manitoba	17 45	St. Louis	6 98

Proportionately low rates are made for all of the ten States contiguous to New Orleans, and reduced rates for special excursions.

The sentiment was strong and universally expressed in favor of doing its utmost to present justly and adequately all phases of education in the country. The committee mentioned above met and considered what further might be needful to school officers and teachers who are to participate in the following classes, as provided in the program of the management.

CLASSIFICATION OF EDUCATIONAL EXHIBITS — GROUP 8.

[Extract from general announcement.]

CLASS 801.—*Education of children, primary instruction, instruction of adults.*

Plans and models of infant schools and Kindergärten, orphan asylums, and nurseries; system, management, and furniture of such establishments; appliances for instruction suitable for the physical, moral, and intellectual training of the child previous to its entering school.

Plans and models of scholastic establishments for town and country; system of management and furniture for these establishments; appliances for instruction: books, maps, charts, apparatus, and models.

Plans and models of scholastic establishments for adult and professional instruction; system of management and furniture of these establishments; appliances for adult and professional instruction.

Appliances for the elementary teaching of music, singing, foreign languages, bookkeeping, political economy, practical agriculture and horticulture, technology, and drawing.

Appliances adapted to the instruction of the blind and of deaf-mutes.

Specimens of the work of pupils of both sexes.

Libraries and publications.

CLASS 802.—*Organization and appliances for secondary instruction.*

Plans and models of establishments for secondary instruction: lyceums, grammar schools, colleges, industrial and commercial schools; arrangement and furniture of such establishments.

Collections: classical works, maps, and globes.

Appliances for technological and scientific instruction and for teaching the fine arts, drawing, music, and singing.

Apparatus and methods for instruction in gymnastics, fencing, and military exercises.

Apparatus and methods for instruction in telegraphy, phonography, and stenography.

CLASS 803.—*Organization, methods, and appliances for superior instruction.*

Plans and models of academies, universities, medical schools, practical schools, technical and mechanical schools, schools of agriculture, observatories, scientific museums, amphitheatres, lecture rooms, laboratories for instruction and research.

Furniture and arrangements of such establishments.

Apparatus, collections, and appliances intended for higher instruction and scientific research.

Special exhibitions of learned, technical, agricultural, mechanical, commercial, and industrial societies and institutions, scientific expeditions.

The report of the committee is printed herewith. It will give that uniformity to the preparation of exhibits needful, first, of the best installation and, second, of their just and fair comparison. Each member of the committee is expected to do his utmost, personally, to promote the success of the Exposition by the use of the means at his command within his State, or locality, or class of institutions in which he may be specially concerned. Several specialists and subcommittees have been appointed, whose names are not yet reported, from whom great aid is expected.

A committee has been appointed in the interests of the education of deaf-mutes. Professor Hailmann, superintendent of schools of La Porte, Ind., and president of the American Froebel Institute, has undertaken specially to aid in the exhibit of Kindergarten material and work in the country and in the provision of a building and teacher for the presentation of class Kindergarten work on the grounds during the entire Exposition. He already reports encouraging progress. The exhibit at Madison of a great variety of school work, organized by President J. H. Smart, LL. D., of Purdue University, La Fayette, Ind., and his coadjutors, in care of the material from the various States and institutions, was of great value. It illustrated specially the value of pedagogical collections and showed how great and valuable an exhibition can be made at a small expense and slight notice. On motion of Dr. Smart, it was voted unanimously at the meeting of the exhibitors to present their present or better exhibits at New Orleans. Each exhibitor seemed stimulated by what he had seen at Madison to do better than he had already done, and many who had never participated in an educational exhibit gained valuable ideas that will aid them in preparing their articles in the accompanying program.

For the information of others interested in the additional classes of the educational exhibits all the remaining classes under the classification of educational exhibits, group 8, are presented:

CLASS 804.—*Printing and books.*

Specimens of typography; autographic proofs; lithographic proofs, black or colored; proofs of engravings.

New books and new editions of books already known; collections of works forming special libraries; periodical publications, drawings, atlases, and albums.

CLASS 805.—*Stationery, book binding, painting, and drawing material.*

Paper, card, and pasteboard; inks, chalks, pens, pencils, pastels; all things necessary for writing desks and offices: inkstands, copying presses, letter scales, &c.

Objects made of paper: lamp shades, lanterns, flowerpot covers.

Registers, copybooks, albums, account books, memorandum books; bindings, loose covers for books, cases, &c.

Various products used in water color painting and tinting; colors in cakes; pastels, bladders, tubes, and shells; instruments and artists' stationery.

Apparatus for the use of painters, draughtsmen, engravers, and modellers.

CLASS 806.—*General application of the arts of drawing and modelling.*

Designs for industrial purposes; designs obtained, reproduced, or reduced by mechanical processes.

Decorative paintings, lithographs, chromo-lithographs, or engravings for industrial purposes.

Models and small articulated wooden models of figures, ornaments, &c.

Carvings, cameos, seals, and various objects decorated with engravings; objects modelled for industrial purposes, produced by mechanical processes, reductions; photo-sculpture, &c., casts.

CLASS 807.—*Photographic proofs and apparatus.*

Photographs on paper, glass, wood, stuffs, and enamel; heliographic engravings; lithographic proofs; photo-lithographic proofs, photographic stereotypes, stereoscopic proofs, stereoscopes; enlarged photographs; color photographs.

Instruments, apparatus, and chemicals necessary for photography.

Materials and appliances used in photographic studios.

CLASS 808.—*Musical instruments.*

Non-metallic wind instruments, with common mouth-pieces, with reeds, with or without air reservoirs.

Metallic wind instruments, simple, with lengthening pieces, with slides, with piston, with keys, with reeds; wind instruments with key boards: organs, accordions, &c.

Stringed instruments played with the fingers or the bow, without key boards.

Stringed instruments, with key boards, pianos, &c.; instruments played by percussion or friction; automaton instruments: barrel organs, bird organs; separate parts of musical instruments, and orchestral appliances.

CLASS 809.—*Medicine, hygiene, and public relief.*

Appliances, instruments, and apparatus requisite for anatomical and histological work.

Plastic anatomical models.

Instruments of medical research.

Apparatus and instruments for dressing wounds and for simple surgery, general and local; anæsthetic apparatus.

Surgical instruments grouped according to their purposes; instruments for amputations, resection.

Special instruments: obstetrics, ovariotomy, urinary channels, ophthalmology, dentistry, &c.; electro-therapeutic apparatus.

Apparatus for plastic and mechanical prothesis.

Orthopedic apparatus.

Trusses, artificial limbs.

Apparatus for restoring persons apparently drowned or suffocated.

Baths and hydro-therapeutic apparatus, gymnastic apparatus for medical and hygienic purposes.

Plans and models of hospitals, various asylums, houses of refuge, almshouses, lunatic asylums; arrangements and furniture for such establishments.

Various apparatus for infirm persons, invalids, and lunatics.

Accessory objects for the medical, surgical, and pharmaceutical services in hospitals or infirmaries.

Chests and cases of instruments and medicines for military and naval surgeons; means and apparatus for succoring the wounded on the battlefield; civil and military ambulances.

Appliances, instruments, apparatus, and all things requisite for veterinary surgery.

CLASS 810.—*Mathematical and philosophical instruments.*

Apparatus and instruments used for mathematical purposes.

Apparatus and instruments illustrating practical geometry, land surveying, topography, and geodesy: compasses, calculating machines, levels, mariners' compasses, barometers.

Apparatus and instruments for measurement: verniers, micrometric screws, dividing machines, scales for scientific uses, &c.

Optical instruments, astronomical instruments.

Physical and meteorological instruments.

Instruments and apparatus requisite for laboratories and observatories.

Weights and measures of various countries.

Coins and medals.

CLASS 811.—*Maps and geographical and cosmographical apparatus.*

Topographical, geographical, geological, hydrographical, and astronomical maps, atlases, &c.

Physical maps of every kind; plans in relief.

Terrestrial and celestial globes and spheres.

Statistical works and tables.

Tables and ephemerides for the use of astronomers and sailors.

In other world's fairs these articles have been often presented solely in their mercantile relation, but the management of the World's Industrial and Cotton Centennial Exposition, while not injuring but increasing their value as exhibits in their mercantile relations, proposes to present them in their educational connection as a means of advancing the ideas of their use among visitors, or, in other words, educating the people in their use. A large amount of conference and correspondence has already been commenced in reference to these several groups. Already very important assurances of coöperation have been given. Capt. Henry T. Brian, foreman of the Government Printing Office, the

largest in the country, and perhaps in the world, will specially aid in bringing out the exhibit in classes 804 and 805. It may be mentioned that under class 809 all the State and city boards of health have been addressed, and many hearty assurances of coöperation have been received from them, as well as from heads of institutions and houses intending to participate in the Exposition. The project of making a complete collection of the newspaper and other periodical publications of the United States has been submitted to Major Burke, the director general of the World's Industrial and Cotton Centennial Exposition, and approved by him. This project includes a place for each publication during the Exposition and a final preservation of the whole, as a historical collection, to be preserved in one of the New Orleans libraries. It is hoped that each publication will, in a number or numbers, have a general account of its own city at date and of the Exposition. The duty of the educator in all this work is chiefly twofold: first, to aid in the exhibition of educational conditions and processes and, second, to use the material thus collected, nay, the exhibition itself, for the purposes of future instruction.

CONCISE HISTORIES OF INSTITUTIONS.

I desire specially to urge all heads of systems and institutions to embrace the opportunity to make historical collections, because altogether the most lasting and valuable contribution will be a concise history of each institution embraced in the plan. This will be included in the official publications of the Government, and will find its way into the principal public libraries in this and other countries, within reach of any person who may now or hereafter have occasion to refer to the information therein contained.

Full credit of authorship will be given to these several summaries, and such generalizations, statistical results, and illustration by maps and diagrams will be made as the subject will permit. It is highly desirable that engravings of plans and views of buildings and grounds should accompany these condensed histories, but this, if done, must be at the expense of the institutions. The engravings, or an electrotype copy, will, however, be returned to those procuring them with a view to their use in catalogues and other publications for which there may be occasion in the future.

A limit to these summary histories will be stated after some preliminary inquiries shall have been completed; and every effort will be made to secure a perfectly fair and impartial opportunity to each institution, without prejudice or preference.

In the arrangement of these summary histories and in the deductions and generalizations that may be drawn from them, the subject will be distinctly and prominently presented by States, preceded by a general statement of the policy and plan that have been pursued in each for the

encouragement and regulation of its higher seminaries of learning. A general summary of general results will also be prepared.

As to the subject matter of these summaries, they should show the general facts:

(1) Name of the college or university, and its origin and changes, with the reasons therefor.

(2) Date of organization and incorporation; denominational or other control.

(3) Location, and the reasons that determined it.

(4) Brief notices of founders and patrons.

(5) Description of buildings; extent of college grounds and of other lands and estates.

(6) General or special objects and original plan of organization, with its subsequent modifications and present status.

(7) Preliminaries of organization and brief notice of academic or other institutions from which it may have sprung, with dates of their establishment, their changes, &c.

(8) Summary of special legislation relating to the institution and of the decisions of courts affecting property or rights, with references to documentary and other authorities, in which these can be studied in detail.

(9) Relation to or dependence upon State governments, and patronage or grants from State or General Government, with dates, amounts received, or other information concerning them.

(10) Extent and history of local, denominational, or other endowments; their income, investment, and limitations. These may often be most concisely stated in tabular forms.

(11) Number of trustees, visitors, or other controlling officers; their mode of election and tenure or term.

(12) Organization of the faculty; their mode of election, tenure, powers, &c.

(13) Course and plan of study, with important changes from time to time. Methods of instruction.

(14) Departments of professional or special study, with historical statement of formation and changes.

(15) Libraries, cabinets, laboratories, observatories, apparatus, art galleries, gymnasiums, and other accessories.

(16) College societies, with facts and statistics, dates of formation, discontinuance, consolidations, and changes. These may often be concisely presented in tabular form.

(17) Financial statements; expenses to students; scholarships, prizes, &c.

(18) Lists of graduates, which will be sufficiently presented in copies of the last general catalogue with supplement added.

(19) Such statements as facts may justify in relation to the work ac-

complished by the institution, of course avoiding invidious comparisons with other institutions.

It should be borne in mind that it is difficult to express in a classification or program of arrangements all the details of the methods by which education will be illustrated: (1) as increasing the productiveness of industry; (2) as diminishing pauperism; (3) as diminishing vice and crime; (4) as increasing the public wealth; and (5) as specially qualifying man for the pursuits of life and the duties and privileges of citizenship; and therefore all suggestions are solicited, and it is hoped that no one who has worked out any valuable material which would contribute to this end will hesitate to make it known.

It should be added that the committee of eminent educators already mentioned have agreed that it is expedient to organize an educational meeting at New Orleans during the Exposition. The following committee, consisting of Hon. M. A. Newell, State superintendent of public instruction, Maryland; Hon. W. T. Harris, LL. D., Concord, Mass.; William H. Payne, A. M., professor of the science and art of teaching, University of Michigan; Hon. Le Roy D. Brown, State commissioner of common schools, Ohio; and Hon. A. Coward, State superintendent of common schools, South Carolina, to consider the organization of a permanent and international council of education, as proposed by prominent European educators, have, I understand, agreed to report favorably, and the steps will be taken accordingly at an early date.

It is specially desired to make as perfect as possible the exhibit of the conditions helpful to the early child life before school days, representing fully the nursery, its healthful conditions, food, cradle, toys, &c.

REPORT OF THE COMMITTEE OF THE NATIONAL EDUCATIONAL ASSOCIATION.

The board of management are offering unparalleled opportunities to exhibit the methods, appliances, and products of education. A general acceptance of these generous offers will promote the cause of education throughout the country, and especially in the South. It will also tend to strengthen the schools and institutions making exhibits and deepen their interest in their own work. It is desirable from every point of view that there shall be a display of education worthy of the schools of the United States and equal to the preparations being made by the managers of the World's Industrial and Cotton Centennial Exposition. They have named Hon. John Eaton, United States Commissioner of Education, as the director of the Department of Education, and will aid him in carrying out all measures necessary for the highest success of the enterprise. The execution of all details, as well as the general superintendence of the department, will be under his direction. As the time is short in which to prepare for the Exposition, which opens December 1, all will see the desirableness of giving immediate attention to what they propose to represent, and all intending exhibitors are

requested to communicate their plans, stating what they propose to exhibit, at their earliest convenience, to General Eaton.

In the representation of education, while unity and harmony must control the organization of the scheme, it is desired to consult and preserve the individuality of systems and institutions. It would seem wise to represent the education of the country as a whole, sections and State lines being disregarded, due credit being given for all contributions, whether from States, municipalities, institutions, or individuals, by the mode of installation, by appropriate labels, and otherwise.

It is recommended that the State and city educational authorities act as agents of their respective States and cities in the preparation of the representation of the systems, institutions, and instrumentalities within the sphere and range of their official connection or authority.

It is hoped that educators will embrace this opportunity to illustrate the connection between educational efforts and their results in the public welfare; and that there may be brought to this representation all exhibits showing the effect of education upon individual health and the sanitary condition of communities; showing education as a preventive of pauperism, vice, crime, and insanity, and as a means of increasing the products of industry and the sources of personal and social comfort and confirming individual and civil virtue.

For the purpose of utilizing and extending the benefits of the Exposition, one of the most important instrumentalities is that of reports thereon of competent experts, and it is therefore suggested as desirable that, in all cases where it is practicable, educational authorities, organizations, and institutions should designate suitably qualified persons to examine and report on classes, groups, or individual objects.

In view of the importance of education in its relation to individual and social progress and well-being; in view of its necessity under our form of government, which gives to all the rights and imposes upon all the duties of citizenship; in view of the probable fact that many foreigners will visit the Exposition to see our school material and study our school systems, it is urged that all persons connected with the work of education and all educational institutions shall unite in the effort to make the exhibition of our school interests at New Orleans a credit to the nation.

In order that persons desiring to coöperate may not waste time in trying to learn what the material of the proposed Exposition should consist of, the following more particularized suggestions have been prepared:

ELEMENTARY AND SECONDARY INSTRUCTION.

BUILDINGS AND GROUNDS.

There should be models and diagrams of buildings for infant schools and Kindergarten schools, the ungraded country school, the graded village school with from three to six rooms, from different States of our

country and from foreign countries; also, a model school room, with all its belongings, adapted to a large village or city elementary school building; views, elevations, perspectives, and plans in drawings; photographs and engravings; historical, representative, and ideal educational buildings; and samples of the best public school edifices—rural, village, and city—with working plans. Heating and ventilating apparatus and appliances, photographs and drawings of interiors, and photographs of interiors with pupils in various situations are desirable contributions.

Views and plans should be marked with the dimensions of buildings and date of erection. Representations of buildings unique in character and excellence should be prepared for wall exhibition. Others should be put up in portfolios, lettered with the designation of the State and city or town and name of school or institution, and accompanied with printed or manuscript description of the peculiar features, with the cost, material of construction, date of erection, name of architect, &c. Special representations and descriptions of improved arrangements and apartments, such as drawing rooms, lecture rooms, chemical laboratories, apparatus, cabinets, assembly halls, rooms for gymnastic exercises, playrooms, clothes rooms, teachers' rooms, teachers' conference rooms, recitation school rooms, vestibules, water closets, &c., are desirable.

Plans of grounds, with dimensions, points of compass, and location of building indicated; examples of architectural skill in adapting buildings with symmetrical rooms to irregular city lots; maps of grounds, showing the designs for ornamentation; representations of school gardens, and designs for the same, are also appropriate.

FURNITURE AND FITTINGS.

Teachers' desks, tables, and chairs; scholars' desks, tables, benches, chairs, and settees—approved specimens of such as are in actual use, from State and municipal authorities and institutions; historical specimens illustrating progress; contributions from inventors and manufacturers—only one specimen of a type and not all the sizes; accompanying statements of peculiar features and supposed excellences and advantages of dimensions, respective heights of seat and desk of each size, and relative position of seat and desk as to distance (prices in detail); cabinets for specimens of natural history and apparatus; cases for reference and library books, for portfolios of drawings, &c.; contrivances for the preservation and suspension of maps, window shades, inside blinds, &c., should be exhibited.

All articles of this class should be *samples* in the true sense of the word; that is, such in quality, as respects material and finish, as those in use or made for sale.

APPARATUS AND APPLIANCES.

These should consist of Kindergarten "gifts" and all the materials for illustrative instruction and object teaching and for scholars' work in

infant schools, Kindergärten, and kitchen gardens; also, model samples of every kind of apparatus requisite for teaching, in the ungraded country school and in the graded village or city school, the rudiments of natural history, physics, chemistry, and geometry; specimens of apparatus for the more advanced teaching of the same branches in high schools and academies; globes and maps; the same in relief; maps with special regard to orographical, hydrographical, topographical, climatographical, ethnographical, historical, and statistical particulars; collections and pictures for geographical and historical instruction of different grades; charts and tablets of every kind used in elementary and secondary instruction; atlases, slates, writing books, drawing books and cards, copies, examples, and models for drawing, wire and plastic models for teaching projections and perspective, and all other materials and apparatus for teaching industrial drawing; crayons, pencils and pens, blackboards, erasers and pointers; grading, reckoning, and writing machines; inkwells and inkstands; clocks, bells, and gongs; merit cards, merit rolls, registers, and record books, blank forms of statistical reports, diplomas and medals; uniforms and military equipments; book sacks, book knapsacks, book carriers, and lunch boxes.

Offers of contributions of all sorts of educational apparatus and appliances are solicited from educational authorities, the managers and proprietors of institutions, inventors, manufacturers, and dealers.

TEXT BOOKS AND BOOKS OF REFERENCE.

There will necessarily be considerable duplication in this division. In the first place, it is desirable to have several complete sets of text books actually prescribed and used in the unclassified country school and the different grades of classified public schools, from different foreign nations and from different parts of our own country, as well as in representative institutions for secondary, collegiate, professional, and special schools, in their ordinary binding; then from publishers, collective sets of their text book publications, of whatever description or grade; and, finally, sets from authors of their respective productions; samples of the most complete sets of books of reference provided for elementary schools and in actual use; also, the same in respect to secondary schools, and accompanying statements of the prices of text books; catalogues of books of reference in higher and professional schools. With collections of books, cases should be sent of suitable size, and shelving to contain them. The cases should be neat, but without ornament, with glazed doors; they should be of uniform height for convenience and comeliness of installation, the requisite diversity of capacity being secured by varying the width according to the bulk of the books to be contained or by multiplying the number of cases. The cases should be exactly four feet high or exactly two feet high, with no bottom or top ornament except simple moldings, and these must not ex-

tend beyond the above designated dimensions. The depth of the cases may conform to the sizes of the books to be contained. They should be of dark-colored wood or stained to resemble such.

SCHOLARS' WORK.[1]

This is an extremely important division of the educational exhibition, though, with the exception of drawing, it is not showy in its character. It is not an easy task to arrange a satisfactory scheme, nor will it be easy to carry out the best arranged plan. Much must be left to the taste, judgment, invention, and fidelity of teachers. Although the results of instruction belong to the mind, yet they are to a great degree capable of ocular representation, and all written examinations are based upon this presumption, and upon a little reflection it will be perceived that the scope of this division is very large. It comprises every exercise and performance that is susceptible of a graphic representation, all the work of the pen and pencil, and, in addition, mechanical constructions and productions, modellings and carvings, whether imitations or original designs.

It is essential that each exhibit should be just what it purports to be, and each collection of papers bound up together, or in any way arranged in a set, and each separate individual paper or production should carry on its face a distinct indication of the facts as to its execution necessary to judge of its merits: such as the grade or kind of institution or school; the class in the institution or school; whether a first draught or a copy; time allowed; age and sex of pupils doing the work; whether selected specimens or work of entire class; whether a general examination, an exercise in review, or a regular lesson, with usual time of preparation; date of the performance; whether a copy or an original design; in drawing, whether from flat or round; whether done with reference to the exhibition or taken from ordinary routine work; the county and State, with the town or city. It is obvious that productions without the indication of the essential facts as to their execution have little or no value for purposes of comparison, and therefore for the purposes of an instructive exhibition.

It is hardly necessary to attempt an exhaustive enumeration in detail of all descriptions of scholars' work which might be useful for exhibition. The limits of this program will permit only the most essential suggestions and directions.

The following should be exhibited:

Appliances for care of young children.

Kindergarten work and the work of pupils in Kindergarten training schools.

Primary school slates, with printing, writing, Arabic and Roman figures, drawing, and musical notes, done by classes of pupils, put up like drawers in a rack made for the purpose, twelve in a rack.

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[1] The rules for the preparation of students' work for the Centennial at Philadelphia are given in the appendix.

Writing books completed, attached together in volumes, of all grades. Specimens of writing should be written on paper of the size and shape of an ordinary writing book leaf, unruled, ruled by hand, or machine ruled for the purpose, and neatly bound, the work of a school or class in a volume; individual specimens, on larger paper, of ornamental penmanship, for portfolios or framed for wall exhibition.

Drawing books completed, attached in volumes; drawings bound in volumes and in portfolios; also, specimens for wall exhibition; portfolio of two or three specimens of different kinds, free hand, geometrical, &c., of each grade of a public school course, from the lowest primary class to the highest in the secondary or high school.

The drawings from industrial classes, schools of design, technological schools of different kinds, and schools of fine arts will doubtless constitute one of the most attractive and useful features of the exhibition. Contributions illustrating the courses in drawing and the results attained in each institution of the above classes are desired. They should be loose in portfolios, from which selections may be made for wall display on an extensive scale.

Map drawing, from memory and from copy, with and without printed skeleton; paper of the size of the leaf of the ordinary quarto school atlas; written exercises, comprising English compositions, themes and translations in different languages; exercises in the various elementary branches; exercises in the higher studies, literary, scientific, æsthetic, professional, and technological; specimens of graduating dissertations, orations, and theses.

Written exercises should, as a rule, especially those of an elementary character, be of the regular letter sheet size, with margin for binding, unruled, ruled by hand, or machine ruled. They should be neatly and plainly bound in muslin, in volumes of moderate thickness.

As it is desirable to encourage girls' handiwork in school, it is hoped that specimens of both plain and ornamental will be contributed. The smaller articles may be conveniently arranged for exhibition in large portfolios with card board leaves. Larger ones may be placed in vertical or horizontal show cases. If girls have learned, in school, to cut and make their own dresses, samples should be sent.

SUPERIOR AND PROFESSIONAL INSTRUCTION.

So far as applicable, it is desirable that the foregoing suggestions be regarded. The following additional suggestions are recommended to the authorities of universities and colleges:

DIAGRAMS AND MAPS OF BUILDINGS AND GROUNDS.

The managers of such institutions should present a map of the ground, showing location of buildings as already located and erected, together with the site, in dotted outline, of those that are to be built according to the existing plans. It is estimated that a scale of 1 foot to 1,320 feet, or a quarter of a mile to a foot, would be sufficient for this purpose. The map should include only the college or university grounds proper, and not any farming or other lands that may be owned. An exception to this, however, should be made in the case of agricultural colleges, where experimental farms and premises used for practical instructions should be given in detail, while whatever features are incident to this purpose might be fully represented. Where disconnected grounds are occupied by these institutions, separate maps of each might be given, and in some cases a small outline map of the city or town, showing relative location and distances.

Ground plans of college buildings, showing internal arrangements of different parts, would be very desirable. A scale of 1 foot to 270, or about 22 feet to the inch, is thought most convenient for this purpose, and there may be as many of these as are thought necessary for representing the essential features. A marginal table of reference would explain the uses of the various apartments.

PHOTOGRAPHIC VIEWS.

Photographic or other views of buildings, in number sufficient to represent the extent, style of architecture, and appearance, would be very important. They should not be larger than that known to photographers as the 4–4 size ($6\frac{1}{2}$ by $8\frac{1}{2}$ inches), and might be in sufficient number to fully present the important buildings of the institutions.

PORTRAITS OF EDUCATORS.

A series of portraits of presidents of colleges and of faculties and distinguished founders, benefactors, and friends, as well past as present, would be highly desirable.

CATALOGUES.

Series of college catalogues and of other publications would be of great importance, and, if furnished, should be substantially bound and placed under such regulations as might render them convenient for reference. In each of the foregoing objects, its execution must depend upon the interest felt in the subject by the institutions themselves, as no appropriations have been made for these objects, nor can payment be promised.

SPECIAL INSTRUCTION.

INDUSTRIAL EDUCATION.

Industrial education has assumed a new importance since the Centennial at Philadelphia. Methods and systems there exhibited have taken root and have spread from institution to institution throughout the country. Schools of mechanical engineering have been multiplied and several cities have manual training schools. The instruction imparted in them is directly preparatory to industrial work and of peculiar interest to the South, whose industries are being rapidly increased and whose resources are being developed as never before. Every department of engineering should be excellently represented: civil engineering, by models of bridges and other projects and designs, models of building construction, and representations of work done; mechanical engineering, by carpenter work, patterns for moulding, wood turning, vise work, blacksmithing, foundry work, and machine tool work, by the apparatus employed in these operations, and by apparatus made by students.

The industrial departments of schools for the deaf and dumb, the

blind, and the feeble-minded, and reform schools, should contribute attractive exhibits. Schools of cookery have methods and appliances deserving of attention.

Colleges and schools of agriculture have resources for making instructive exhibits, and thus stimulating the leading American industry.

INSTRUCTION FOR THE BLIND, DEAF-MUTE, ETC.

Schools for the blind, deaf-mute, &c., are requested to exhibit the peculiar features of their instruction, such as—

For the instruction of the blind: Specimens of printing, with the presses by which they were executed; samples of the literature printed; contrivances for aiding in writing, in teaching numbers and geography.

For the deaf and dumb: Graphic illustrations of the mechanism of speech as applied to articulation and lip reading, and of the application of visible speech to articulation: practising mirrors, and books for teaching reading.

For the feeble-minded: Apparatus for physical development and illustrative teaching in the different stages of progress.

CONCLUSION.

Any communications with reference to the educational exhibit at the New Orleans Exposition will receive prompt attention on their transmission to the Commissioner of Education at Washington.

Committee on behalf of the Department of Superintendence of the National Educational Association:

G. J. ORR,
State School Commissioner, Georgia.
W. O. ROGERS,
Superintendent of Schools, New Orleans, La.
AARON GOVE,
Superintendent of Schools, Denver, Colo.
J. H. SMART,
President of Purdue University, La Fayette, Ind.
T. W. BICKNELL,
President of the National Educational Association, Boston, Mass.
B. L. BUTCHER,
State Superintendent of Free Schools, West Virginia.

APPROVAL OF THE FOREGOING PLAN BY THE DIRECTOR GENERAL.

I take pleasure in approving the plan adopted in this report, and in commending its general distribution.

E. A. BURKE,
Director-General.

APPENDIX.

RULES GOVERNING THE DISPLAY OF STUDENTS' WORK AT THE INTERNATIONAL EXHIBITION AT PHILADELPHIA IN 1876; PREPARED BY SUPERINTENDENTS A. J. RICKOFF, J. L. PICKARD, AND J. H. SMART, A COMMITTEE OF THE NATIONAL EDUCATIONAL ASSOCIATION.

CLASSIFICATION.

All material which may be offered for exhibition will be classified as follows:

I. Examination manuscripts prepared according to prescribed rules.

II. Special work, for the preparation of which no rules are prescribed.

III. Material arranged and presented to illustrate systems of instruction.

On account of peculiarities of organization or administration, it may be difficult for an institution or the public schools of a town or city to exhibit in some one of the classes above named, while in another it might be able to make a display which would be creditable to itself and to the whole country. It is, therefore, left to managers of schools and school systems of every grade to exhibit in any class or classes they may elect.

Class I affords an opportunity for the public schools of towns and cities and separate institutions of learning of every grade to compare their own work with the work of others, performed under like conditions.

Class II provides for the exhibition of anything that may be looked upon as of value in the line of educational products. Here no limit is prescribed in time or other conditions of preparation. As a condition of exhibition, however, it is required that the circumstances of the preparation be fully stated.

Class III opens the door for the exhibition of such products of the school room as will serve to illustrate the working of a course of study or a system of instruction. In this class the smallest district school or private institution may have an opportunity to exhibit its plans and ways of working. Here a principal of a single school or one subordinate teacher in a large unorganized mass of schools may submit illustrations of a plan or process of instruction, methods of recitation, &c., in one or more branches of study, though the number of pupils he represents may be comparatively insignificant.

No contribution will be received in any one of the three classes for purposes of competition.

GENERAL RULES.

(*a*) No article shall be exhibited unless the class to which it belongs be stamped or otherwise plainly marked on the article itself or on the cover containing it.

(*b*) It is recommended that all manuscript work, especially in Class I, be written on letter paper 8½ by 10½ inches in size.

(*c*) The questions to be answered should be written or printed directly above each answer in all manuscripts in arithmetic; and in all other subjects the same course should be pursued or the answers should be so framed that the question may be plainly indicated thereby. The latter is the better plan.

(*d*) Every set or collection of manuscripts on any subject must be accompanied by the full list of questions presented the class in that subject, which list should be inserted immediately after the appropriate title page.

CLASS I.—EXAMINATION MANUSCRIPTS.

RULE 1. *Who may be examined.*—None but bona fide pupils of the schools and of the particular grade of schools purporting to be represented shall be permitted to contribute anything for exhibition in Class I.

RULE 2. *Time of examination.*—All manuscripts to be exhibited in this class shall be prepared from the 1st to the 15th of February. Not more than four hours shall be allowed for the writing of a paper on any one branch of study, which time shall include the entire work from the time the questions are placed before the pupil to the completion of the copy submitted.

RULE 3. *The ground of examination.*—The ground or limit of the examination shall be the work done within the current school year up to the time of the examination and work preliminary thereto, according to the course of study of the institution or schools preparing the work, which course of study shall accompany all manuscripts sent for exhibition.

RULE 4. *Questions, by whom prepared and precautions to be observed.*—The questions for examination shall be prepared by the superintendent of schools or some other person not engaged in the instruction of the class or classes under examination, and the utmost care shall be taken that no information in regard to the nature or topics of the questions be circulated among the pupils and that no previous intimation of the ground of examination, except as in Rule 3, be given to the teachers of the classes to be examined.

RULE 5. *Manuscripts to be exhibited.*—All schools, colleges, technical schools, special schools, and school systems of towns and cities exhibiting in Class I may be represented, first, by papers prepared as above from one entire class of each grade, in which pen and ink are used in writing, and, second, by not less than one paper in ten selected from all the other manuscripts prepared in the examination.

[NOTE.—It is to be understood that when any grade of pupils, fifth year grade, for example, is examined, all the pupils in that grade throughout the entire town or city system shall be examined in all branches upon which written examinations are required for transfer; and that thereafter, for each of the subjects, the manuscripts of some one entire class of that grade be taken for exhibition, and also one-tenth of all the other manuscripts of that grade; and, further, that the exhibition of manuscripts of entire classes and selected manuscripts shall be especially subject to the following rule:]

RULE 6. *Title page and declaration of chief officers.*—A title page, after model A, for the papers of entire classes, or after model B, for selected papers, shall be inserted in every volume, collection, or set of manuscripts designed for exhibition in Class I; and no papers shall be admitted for exhibition in this class unless accompanied by a declaration from the principal executive officer of the school or other institution of learning thereby represented, that said papers were executed in accordance with the above rules and Rule 7, as below.

[NOTE.—The course of study in some towns and cities is divided into eight grades, to correspond approximately with the average time taken for completing the course assigned to primary and grammar schools. In such cases it will be easy to fill this blank; but, when the number of grades does not correspond with the average number of years thus required, it is desirable that the blank be so filled as to show approximately what year of the course is represented by the manuscripts.

In the title page marked A it might be well to insert the name of the teacher of the class under the words "one entire class represented."]

TITLE PAGE, MODEL A.

(Name of institution or school system. Location.)

MANUSCRIPTS OF EXAMINATION

OF

(Insert here the grade or grades of the class or classes examined.)

BEING THE —— YEAR OF THE COURSE

IN

(Insert here the subjects of the examination.)

HELD

(Insert here the date of examination.)

ONE ENTIRE CLASS REPRESENTED.

(The name of the teacher may here be inserted.)

The class has pursued this study —— ——.
Whole number of pupils in the grade, ——. Average age, ——.
Whole number of pupils in the class represented, ——. Average age, ——.
The number represented is —— per cent. of the whole number in the grade.
Total enrolment in all the schools at the time of examination, ——.

TITLE PAGE, MODEL B.

(Name of institution or school system. Location.)

MANUSCRIPTS OF EXAMINATION

OF

(Insert here the grade or grades of the class or classes examined.)

BEING THE —— YEAR OF THE COURSE

IN

(Insert here the subjects of the examination.)

HELD

(Insert here the date of examination.)

SELECTED PAPERS.

The class has pursued this study —— ——.
Whole number of pupils in the grade, ——. Average age, ——.
Number of pupils represented by the selections, ——. Average age, ——.
The number represented is —— per cent. of the whole number in the grade.
Total enrolment in all the schools at the time of examination, ——.

RULE 7. *Headings of manuscripts and declarations of students or pupils.*—Every manuscript of every pupil or student should be headed, in the pupil's own handwriting, with his name, age, grade or class, the name of the school or institution of which his class is a part, and the date of the examination. At the foot of the last page it should contain, also in the pupil's own handwriting, a minute of the time taken for the writing of the paper, which must include the whole time elapsing from the putting of the questions before the pupil to the handing in of the copy exhibited. On the completion and handing in of any manuscript or specimen for exhibition under Class I the student or pupil should make the following declaration on a separate slip of paper, over his own signature, viz: "This accompanying manuscript was written by myself, without aid from any source."

The manuscripts of every class shall be accompanied by a written declaration by the teacher, or by the one who had charge of the pupils of the class at the time of the

examination, that the entire work of the class was done under his own eye and that all the regulations were observed as herein prescribed. These certificates, written on separate sheets of paper, shall be sent to the superintendent or other officer having the direction of the examination. They need not, however, be sent to the exhibition. (See Rule 6.)

CLASS II.—SPECIAL PRODUCTS.

Bound volumes or portfolios of examination papers prepared at any previous time in regular examinations, and without reference to the Centennial or any "exhibition." An exact statement of what it purports to be should accompany each collection of this class. Such statement should set forth whether the collection is from an entire class or whether the papers are selected; and, if selected, what part of an entire grade is represented; also, the time occupied in the examination, the rules under which it was conducted, and all such other information as may be necessary to enable any one to judge of the merit of the exhibition. In Class II may be included also any work of students or pupils connected with or incident to school work, such as collections of insects, plants, shells, &c., collected and arranged by pupils or graduates of schools, colleges, or other institutions of learning; specimens of manual skill in the construction of models of any sort prepared for the illustration of school studies; drawings and specimens of penmanship of special merit; in short, anything which may be fairly exhibited as results of school instruction or training. Every production in this class should be accompanied by a statement of the age, sex, and class of the pupil, the time occupied in producing the article, whether it was made with or without the assistance of professors or teachers, and of all the circumstances which should enter into an estimate of its educational value or bearing.

It is not necessary that students or pupils contributing to this class be members of the schools represented during the current year. All that is required is that they should have been bona fide members of the school represented and that the work be directly traceable as the result of school instruction.

CLASS III.—MATERIAL TO ILLUSTRATE SYSTEMS OF INSTRUCTION.

Specimens of examination papers, exercises in review, regular lessons, or class exercises of any nature which may be adapted to exhibit and illustrate the course and method pursued in any line of study or instruction, from the commencement to the end thereof, in any public, private, or corporate institution or system of institutions of learning. The value of any exhibition in this class will not depend so much upon the excellence of the specimens submitted as upon the clearness with which they may show, in outline and in detail, the plans and processes of instruction pursued. The specimens should be few, and it is quite indispensable that they be accompanied by written or printed explanations, as the case may seem to demand. More will depend in this department than in any other upon the judgment, invention, and taste of teachers and school officers; more, indeed, than upon the skill with which the schemes may be carried out in practice. Exhibitions in this class may also consist of proposed schemes or syllabuses of instruction in any department of literature, science, or art, without accompanying specimens from pupils, if, from the nature of the case, illustration be impracticable. If, however, any scheme is submitted as one which has been adopted in any institution or system of schools, it is not to be accepted as such, unless it be explicitly stated by the highest executive officer of such institution or system that it has been as regularly and systematically carried out in practice as any other work required in the school or schools under his or her care.

DRAWING AND PENMANSHIP.

All exhibitions in drawing and penmanship shall be stamped or otherwise plainly marked as entered for exhibition in Class I, II, or III, as the case may be; and the preparation and display of the same shall be governed by all the rules for the respective classes, and in addition thereto by the following.

SPECIAL RULES FOR PENMANSHIP.

Specimens in penmanship shall be written on paper of the ordinary size of the writing books commonly used in the schools, and shall consist of not less than eight or ten lines of poetry or prose, the selection to be announced only at the time of writing. (See Rule 3.)

No written copy shall be permitted, either on blackboard or elsewhere, in sight of the pupil at the time of writing. Not more than two hours shall be given to the writing of such a specimen after the matter to be written is placed before the pupil.

SPECIAL RULES FOR LABELLING DRAWINGS.

The labels are the underscored words and they are to be used to designate drawings according to the explanations annexed.

In the drawing of problems, the thing required shall be written out in the pupil's own handwriting on the same sheet and side of the sheet with the drawing.

FROM FLAT COPY.

Free hand.—Drawings from flat copy, without the use of a rule, straight edge, or measure of any kind at any step of the work.

Semi free hand.—Case 1. Drawings from flat copies, in which the construction lines were made with a rule or in which points were located by the aid of rule or measure. Case 2. Drawings made on paper having construction lines or points either made in or printed on the paper.

Instrumental.—Drawings of machines, geometrical or architectural problems, or any kind of drawings made from flat copy, and in which mechanical appliances have been used.

FROM DICTATION.

Free hand.—Drawing made entirely free hand, line by line or part by part, at dictation of teachers, no rule or measure of any kind being allowed.

Semi free hand.—Drawings in which distances were measured or construction points were located, but otherwise free hand.

Instrumental.—Drawings in which the rule or measure was freely used.

FROM MEMORY.

Free hand.—Drawings made entirely free hand.

Semi free hand.—Drawings in which construction lines only were made or construction points were located with the rule or by measure.

Instrumental.—Drawings from memory with the free use of mechanical aids.

MECHANICAL.

The solution of problems.—Whether geometrical, in mechanical contrivance or architectural arrangement, either from the object or to satisfy given conditions or dimensions or both, wrought out by the pupils, in the execution of which the usual mathematical principles and mechanical aids are made use of.

OBJECT DRAWING.

From the object, without the use of vanishing points, horizon lines, or projections.

From objects in alto-rilievo, as above.

From objects in demi-rilievo.

From objects in basso-rilievo.

OBJECT DRAWING FROM DICTATION.

The teacher stating the position in which the object is supposed to be, the pupil makes the drawing without seeing the object in that position.

PERSPECTIVE.

Drawings of problems made by mathematical perspective.

Drawings from the object with the use of mathematical perspective.

Drawings made with the use of elementary perspective, either as the solution of a problem or from the object.

DESIGNS: FREE HAND, SEMI FREE HAND, OR INSTRUMENTAL, AS THE CASE MAY BE.

Entirely original.—Designs made from natural objects in which the particular natural objects from which they are taken are manifest.

Original combinations.—Designs made up of elements taken from other designs and recombined, making new arrangements.

Original, with given elements.—Designs in which given elements are combined, the plan and arrangements being the pupil's.

Elements and arrangements given.—Designs in which the elements and arrangement of the elements are given by the teacher.

NOTE.—If tracing paper be used in any part of the work presented under the head of design, the fact must be stated.

CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 6—1884.

RURAL SCHOOLS: PROGRESS IN THE PAST; MEANS OF IMPROVEMENT IN THE FUTURE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

CONTENTS.

APPENDIX.

LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., September 23, 1884.

SIR: The elementary education of the people, the means for its accomplishment, its limits, its purposes, are at the present time prominent subjects of thought and discussion among civilized nations.

In countries more densely populated than our own the elementary education of the rural population is as much considered, the standards are as fixed, the inspection of the work as thorough as in the corresponding departments of their cities.

This is the case in very few States of the Union. As a rule there is a want of system, of continuous progress or continuous record, of definite aims, and of vital connection with other institutions which prevents the rural schools of the United States from accomplishing all that may reasonably be expected of them.

The need of improvement in this respect is generally recognized; and the call for information and suggestion bearing upon this subject became so great that I directed Miss Annie T. Smith, formerly a successful teacher and now a member of this Office, to prepare a circular of information covering a certain portion of the inquiries that are constantly arising.

The material of the Office was placed at her disposal and correspondence was held with school officers of foreign countries in which special efforts have been recently made to secure the most efficient organization of country schools.

Thanks are due to the school officers abroad and at home who have facilitated the work by furnishing documents and answering questions upon special points. I have the honor to recommend the publication of the article.

Very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

Publication approved.

H. M. TELLER,
Secretary.

481—482

IMPROVEMENT IN INSTRUCTION IN RURAL SCHOOLS.

In all civilized countries unusual activity is noticeable at the present time with reference to the education of the people. This activity is due in the main to two causes: on the one hand, society is more than ever impressed with the sense of responsibility toward individuals; on the other, ruling powers recognize more clearly that the stability of their governments depends in great measure upon the intelligent consent of the governed. In addition to these influences, which are not without some effect among ourselves, we have incentives to increased effort in respect to popular education from conditions peculiar to our present stage of progress. The intellectual wants of our rural population especially urge upon us a serious consideration of the means by which the efficiency of our rural schools may be increased.

The founders of our institutions appear to have realized so much more fully than we do the relation between the welfare of a republic and the general diffusion of knowledge that it is well for us to preface every consideration of the ways by which the work may be extended and strengthened by recalling their views as to its ultimate results.

In the light of such utterances as the following, we shall at least see that unity of purpose and of action with reference to education is the logical outcome of a conviction common to our leaders, without regard to party or sectional proclivities :

Knowledge is in every country the surest basis of public happiness. In one in which the measures of government receive their impressions so immediately from the sense of the community as in ours it is proportionably essential. To the security of a free constitution it contributes in various ways: by convincing those who are intrusted with the public administration that every valuable end of government is best answered by the enlightened confidence of the people, and by teaching the people themselves to know and value their own rights; to discern and provide against invasions of them; to distinguish between oppression and the necessary exercise of lawful authority, between burdens proceeding from a disregard to their convenience and those resulting from the inevitable exigencies of society; to discriminate the spirit of liberty from that of licentiousness, cherishing the first, avoiding the last, and uniting a speedy but temperate vigilance against encroachments with an inviolable respect to the laws.—WASHINGTON, *First annual address.*

The wisdom and generosity of the legislature in making liberal appropriations in money for the benefit of schools, academies, and colleges is an equal honor to them and their constituents, a proof of their veneration for letters and science, and a portent of great and lasting good to North and South America and to the world. Great is truth, great is liberty, great is humanity, and they must and will prevail.—JOHN ADAMS.

A system of general instruction which shall reach every description of our citizens, from the richest to the poorest, as it was the earliest, so will it be the latest, of all the public concerns in which I shall permit myself to take an interest.—JEFFERSON.

If a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be. The functionaries of every government have propensities to command at will the liberty and property of their constituents. There is no safe deposit for these but with the people themselves; nor can they be safe with them without information. Where the press is free and every man able to read, all is safe.—JEFFERSON.

A popular government without popular information or the means of acquiring it is but a prologue to a farce or tragedy, or perhaps both. Knowledge will ever govern ignorance, and a people who mean to be their own governors must arm themselves with the power which knowledge gives.

Learned institutions ought to be the favorite objects with every free people; they throw that light over the public mind which is the best security against crafty and dangerous encroachments on the public liberty. They multiply the educated individuals from among whom the people may elect a due portion of their public agents of every description, more especially of those who are to frame the laws, by the perspicuity, the consistency, and the stability, as well as by the justice and equal spirit of which, the great social purposes are to be answered.—MADISON.

Let us, by all wise and constitutional means, promote intelligence among the people as the best means of preserving our liberties.—MONROE.

There is but one method of preventing crime and of rendering a republican form of government durable, and that is by disseminating the seeds of virtue and knowledge through every part of the state by means of education; and this can be done effectually only by the interference and with the aid of the legislature. I am so deeply impressed with this opinion that were this the last evening of my life my parting advice to the guardians of the liberty of my country would be Establish and support public schools in every part of the State.—DR. RUSH.

I cannot be more perfectly convinced than I am that virtue and intelligence are the basis of our independence and the conservative principles of national and individual happiness.—CHIEF JUSTICE MARSHALL.

The parent who sends his son into the world uneducated defrauds the community of a useful citizen and bequeaths to it a nuisance.—CHANCELLOR KENT.

Open the door of the school-house to all the children of the land. Let no man have the excuse of poverty for not educating his own offspring. Place the means of education within his reach; and if they remain in ignorance, be it his own reproach. If one object of the expenditure of your revenue be protection against crime, you could not desire a better or cheaper means of obtaining it. Other nations spend their money in providing means for its detection and punishment, but it is for the principles of our Government to provide for its never occurring. The one acts by coercion, the other by prevention. On the diffusion of education among the people rests the preservation and perpetuation of our free institutions.—DANIEL WEBSTER.

The first duty of government, and the surest evidence of good government, is the encouragement of education. A general diffusion of knowledge is the precursor and protector of republican institutions, and in it we must confide as the conservative power that will watch over our liberties and guard them against fraud, intrigue, corruption, and violence. I consider the system of our common schools as the palladium of our freedom; for no reasonable apprehension can be entertained of its subversion as long as the great body of the people are enlightened by education. To increase the funds, to extend the benefits, and to remedy the defects of this excellent system is worthy of your most deliberate attention. I cannot recommend in terms too strong and impressive as munificent appropriations as the faculties of the State will authorize for all establishments connected with the interests of education, the

exaltation of literature and science, and the improvement of the human mind.--DE WITT CLINTON.

If I had an archangel's trump, the blasts of which could startle the living of all the world, I would snatch it at this moment and sound it in the ears of all the people of the debtor States and of the States which have a solitary poor, unwashed, and uncombed child untaught at a free school, "Tax yourselves."

For what?

First. To pay your public State debt.

Second. To educate your children, every one of them, at common primary schools at State charge.—HENRY A. WISE, of Virginia.

It is your duty and your highest interest to provide and to maintain within the reach of every child the means of such an education as will qualify him to discharge the duties of a citizen of the Republic.—BISHOP DOANE, of New Jersey.

There is a positive antagonism between the possession of civil power requiring the highest exercise of reason and the want of that intelligence and integrity which are essential to the right use of reason itself. —E. D. MANSFIELD, LL. D.

Knowledge carries with it influence over the minds of others, and this influence is power; in free government, what is of more vital concern, it is political power.—GENERAL JOHN A. DIX.

The object of the common school system of Massachusetts was to give to every child in the Commonwealth a free, straight, solid pathway, by which he could walk directly up from the ignorance of an infant to a knowledge of the primary duties of a man, and could acquire a power and an invincible will to discharge them.—HORACE MANN.

These are but a few of the many sayings that might be cited in this connection. It would be easy to add abundant evidences of a like relation of thought in the minds of men of other nations who have been the advocates of free government; but this is hardly to my purpose. Two extracts only I will present because of the men who speak and the part each has played in the history of that republic which is adding to the good things it offers for the imitation of the world some excellent models in the matter of primary education:

Universal education is henceforth one of the guarantees of liberty and social stability. As every principle of our government is founded on justice and reason, to diffuse education among the people, develop their understandings, and enlighten their minds is to strengthen their constitutional government and secure its stability.—GUIZOT.

We place the interest of the great question of public instruction above all personal quarrels, and it pleases me to see that in the midst of the inevitable antagonisms of public life all good citizens are united on this point. Of all the efforts of thinkers, writers, and statesmen, there is only one which is really efficacious, profound, and productive, viz, the diffusion of education—that social capital, the best of all capitals, which gives every man who comes into the world the means of gaining all other capitals, and thus of securing a position without force, without violence, without civil war.—LÉON GAMBETTA.

The idea common to these utterances is not a vain speculation: men have become Spartans or Corinthians according to their training; kings and priests have found in schools the most effective instrument for shaping men to their uses, and so, in turn, it has been made evident that "the arts and methods of the schoolmaster" may be employed to develop and maintain among a people the capacity for freedom. It is as agents for the accomplishment of this purpose that the common schools demand the serious and equal interest of all citizens.

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The interest of the citizens, it must ever be remembered, counts for much more in the United States than elsewhere. What the education department is in England or the ministry of public instruction in Prussia, the people are in this country: the court of final appeal and of ultimate authority; they never have delegated and probably never will delegate their power in school matters so entirely to officials as to be themselves rid of the responsibility. This diffused authority has its disadvantages, as all who are engaged in the direct work of the schools experience; but it accords with the political instincts of our people; and when we view the operations of the system as a whole we cannot fail to be impressed with the evidences that the people have thus far proved themselves equal to the trust they have assumed and which they so tenaciously hold.

EVIDENCES OF PROGRESS.

There is a period, a crude period, in American communities when the local spirit is the sole dependence of the school; but the time soon comes when the local spirit makes for progress only so far as it manifests itself in the united action of communities and formulates itself in laws binding alike upon all. This leads naturally to the appointment of executive officers interested equally in all the districts included in the operation of the law. The tendency to united action may be taken as marking a somewhat advanced stage of social life, and we have reason for satisfaction with the past and ground for hope as to the future in the fact that it has been so generally attained by us.

Individual districts have, it is true, in many instances failed to seize the opportune moment for combined action or to acquiesce in the results of such action; nevertheless, the principle has so far prevailed among us that a system of school supervision has been established in every State.

INFLUENCE OF SUPERVISING OFFICERS.

While comparatively little authority is vested in the officers of supervision they are the source of a great, often a determining, influence in school affairs. As a rule, State officers of education have not rested content with simply executing the laws already enacted. A few names of those who have been most prominent in the service, as Mann in Massachusetts, Barnard in Connecticut and Rhode Island, Flagg, Dix, and Randall in New York, Lord and Andrews in Ohio, Breckinridge in Kentucky, are sufficient to call to mind a long series of untiring, persistent efforts to enlighten the people as to the conditions of excellence in schools and to stimulate further legislation in their behalf. In the past, the general features of the State systems have received most attention: the compiling and codifying of school-laws, the establishment of normal schools and of standards of qualification for teachers' licenses, the abolition of school rates and the increase of school taxes where these are meagre (as in the South), the consolidation of small districts

in the older Northern States, the management of school moneys, the construction of school-houses, and the care of school property are among the important measures that have been accomplished or accelerated by the efforts of supervising officers.

These measures have prepared the way for the more immediate consideration of the internal work of the schools.

What part, what beneficial part, each of the agents upon whose co-operation the efficiency of the schools depends will bear in this effort remains to be determined. Plans of action may be devised in the supervisory departments, but they cannot succeed without the support of the people on the one hand and of the teachers on the other. The want of such union has heretofore kept the rural schools from developing as rapidly as the circumstances of the country require, but we seem now to have reached a point when the union can be accomplished. The needs of the rural schools have been considered in recent meetings of teachers' associations and institutes and of the Department of Superintendence; conferences have been held between State and local school officers for the purpose of bringing about a better understanding of the subject, and many efforts have been put forth to rouse the people to a higher sense of their duties and privileges in this respect. A great point will be gained when the people are so thoroughly determined upon maintaining a fair average of excellence in their schools that local school committees, who are their direct representatives, shall no longer be able to evade with impunity the plain intent of school laws, as, for instance, the law requiring that only licensed teachers shall be employed, which is practically null so long as local officers may and continually do influence the decision of examining bodies in the interest of incompetent candidates.

PRESENT CONDITION OF UNGRADED SCHOOLS.

When we consider that the rural schools of our country provide elementary instruction for more than one-half of our school population, and all the formal education that the majority of this half ever receive, and, further, the great diversity of conditions represented in this population, it seems strange that a people so fertile in expedients as our own should have adhered so closely as they have done to one type of rural school.

The type is familiar to us all: A school composed of scholars of both sexes, ranging in study anywhere from the primer to Euclid, housed in a school-house of but one room and provided with one teacher, upon whom devolves all the instruction and discipline. Possibly the teacher changes every term; probably no systematic record of studies, classes, or progress is kept, and each teacher takes up the work as if nothing had gone before and ends it as if nothing were to follow. The teacher may be a person of excellent education, wise, conscientious, firm, loving, and versatile; many such there are, and "their works do praise them;" but a school may be favored in this respect one term and the

next pass into the charge of a callow youth, a crude girl, or a man or a woman of inferior mind and harsh, unsympathetic nature, who, for a consideration, makes "confusion worse confounded" in juvenile intellects. Of supervision there is little, of inspection less, and of standards of scholarship and tests of work none but those the teacher has wit enough to supply.

Such is the rural school as it exists among us to-day. Some of the best minds of the country have been fostered by this instrumentality, some of the noblest powers aroused and the highest aspirations kindled, but it is impossible that a high average of results should be attained under the circumstances.

If this be evident upon the survey of the schools themselves, how much more urgent appears the demand for their better organization and more efficient conduct when we turn our attention to what is going on in other countries, when we consider, for instance, that in England rural schools are subjected to an inspection as thorough as that which is applied to the city schools; that in France it is proposed to establish schools above the elementary grade accessible to all country children; that in Belguim every country boy is trained in drawing, in the construction of geometrical forms, in the use of weights, measures, and surveyor's instruments, and in the analysis and application of whatever products his district supplies to the industrial arts; that in Germany and in Switzerland only well trained teachers are employed even in the most obscure districts.

The courses of instruction adopted in several of the foreign countries mentioned differ in important particulars from that usually followed in the United States. They are more practical, provide more efficiently for the combined training of hand, mind, and eye, as may appear hereafter. It is not, however, the purpose of this circular to discuss the comparative merits of different theories or courses of instruction, but rather to consider certain conditions that are required to give efficiency to any course. When these have been secured it will be easy to modify or extend a particular curriculum. In the consideration proposed it will be necessary to exclude schools that are too large to be managed by one teacher, and also those whose enrolment is so small that the force and enthusiasm of numbers are wanting. If the average attendance of a school be less than twenty scholars, it is better that it should be combined with the school of an adjoining district, and, if the average attendance be above thirty-five or forty and the ages and attainments of pupils greatly vary, an assistant is needed. With schools enrolling between twenty and forty pupils, good results are assured if the teacher be well qualified and properly supported.

THE TEACHING FORCE.

Wherever the education of the masses is attempted, the problem chiefly discussed is how to secure competent teachers. It is indeed no

longer insisted that a competent teacher is the sole requisite to a good school. The best teacher, it is allowed, cannot overcome the effects of bad air in the school room, unsightly premises, apathy and selfishness in the community, and ignorance and obstinacy in superior officers. Experience, however, indicates that all external conditions of efficiency are more easily secured, when once their nature is understood, than well qualified teachers. A good school-house costs little more than a poor one; it needs only that the distinction should be perceived; by combination small districts may bring their schools under excellent supervision; but in the United States at least the means of keeping the teaching force up to a fair average of qualification falls far short of the requirements.

Insufficient qualification of common school teachers.—To understand the state of the case it is only necessary to consult recent education reports. In 1881 Rhode Island reported 13 per cent. of the teachers employed in the State as having had only a district or common school education. In Georgia, out of 6,128 teachers, 5,000 are represented as having limited education. If the other States be classified according to their own showing, the greater number will be found on the side of Georgia, with a majority of poorly prepared teachers. The record of the examinations for teachers' certificates makes the case still plainer. Thus, in Michigan, by the revised school law (1881), provision is made for the examination of teachers by county boards of examiners and the State board of education. The former may grant three grades of certificates, of which the lowest entitles the holder to teach in the county for which it is granted for one year, but no certificate is granted to any person who has not passed a satisfactory examination in orthography, reading, writing, grammar, geography, arithmetic, the theory and art of teaching, and after the year 1881 in the history of the United States and civil government. These are not high attainments, but it has not been easy to find candidates possessed of them. Upon this point the superintendent, Hon. Varnum B. Cochran, said in his report for 1881:

> The examiners were advised to be more lenient in the fall examinations for the third (i. e., lowest) grade than in their judgment would be warranted at a later period, when applicants had become more fully informed of the requirements and greater opportunities for preparation had been afforded. * * * The examiners very generally acted upon these suggestions, but notwithstanding their aim at leniency an average of 26 per cent. of the applicants were rejected upon the first trial, and the secretaries report an average of 21 per cent. of final failures.

The state of things disclosed in these records is not due to the want of high ideals among us. "We must not," says Governor Brownlow, "expect our schools to be better than our teachers, and their quickening of the minds of our youth must determine the character of our citizens for the observance of law and for the production of wealth in the various pursuits of life."

Said Horace Mann, "He is not worthy to have the care of children

either as officer or teacher whose heart does not yearn toward them with parental fondness and solicitude."

"A boy," says Dr. Channing, "compelled for six hours a day to see the countenance and hear the voice of a fretful, unkind, hard, or passionate man is placed in a school of vice."

Such sentiments never fail to please the popular ear, but it needs to be impressed upon the popular mind that they are effective only so far as they lead to provision for their practical realization. Keeping in mind, then, that the improvement of the schools means always and chiefly the improvement of the teachers, the following conditions present themselves for consideration: (1) The preliminary training of candidates for teaching; (2) the teacher's continued use of the means of progress; (3) subjects and methods of instruction in common schools; (4) modes of appointment and salary as affecting the teacher's term of service; and (5) supervision and inspection of the schools.

This circular will be limited to the first three considerations.

The training of teachers.—The States have recognized their obligation to make provision for the training of teachers by establishing State normal schools. All of the States, excepting Delaware, Georgia, Ohio, South Carolina, Louisiana, and Nebraska, now have such schools, the total number being 98. Pennsylvania has 10, New York 8, Massachusetts 6, Missouri 5, Wisconsin and Maine each 4, and all of these offer courses of study and training of at least two years' duration.

If we examine into these courses we shall see that they are designed to maintain a very fair standard of qualification for teachers. On the academic side they include a somewhat extended course of secondary instruction, and, on the professional, training in the theory and practice of teaching. As regards teachers and appliances they are generally well equipped, but it will readily be seen that they are too few for the work in hand.

The number of public school teachers in the United States, city and county, has reached, according to the latest Report of the Commissioner of Education, a total of 293,294. It is impossible to state the number employed in the ungraded rural schools, but it must be a very large proportion of the whole; and, on the usual assumption that 30 per cent. of the teachers are changed annually, the State normal schools (numbering, as before stated, 98 and having an attendance of about 18,000 students) afford but a small part of the provision required for training teachers. In Germany, when it becomes evident that a change is required in some matter affecting the schools, it is customary to appoint local commissioners, consisting of parents and school officers, who are authorized to investigate the case and report their observation and offer their advice. Something of this kind is needed among us now, as a means of rousing the people to a sense of their duty with reference to

providing the means of preparing teachers whom they will employ for the education of their children.

We can scarcely imagine such a commission, composed of the school men, professional men, and the mothers in a country district, in which it would not be agreed that no person was fit to serve as a teacher who had not shown a due conception of the importance of the work by making special preparation for it. By this very admission the nature and the means of preparation would be brought into consideration, and it would certainly be allowed that the number of normal schools must be increased or some other means be devised for accomplishing the desired end.

Until the people, acting in their public capacity, make adequate provision for the instruction and training of teachers, private effort must supply the deficiency. A number of instrumentalities occur to mind that are available for this purpose, the courses of instruction and training afforded by the normal schools being taken as the criterion. The available candidates for the service of rural schools are often persons who cannot bear the expense of attending schools of secondary or superior grade. This difficulty might be obviated by the creation and judicious use of teachers' scholarships. Help might also be afforded by the societies for encouraging study at home. These societies already exercise a marked influence upon our teachers of higher grade schools, and they could impart a great impetus to the rural schools by making a specific effort in their interest. If some one of these societies were to arrange a course of study for elementary teachers, and a few intelligent persons in each district were to take it upon themselves to encourage suitable young persons to pursue the course, assisting them with such counsel and sympathy as the old and experienced can easily give to the young, the intellectual life of the country people would be greatly stimulated, and, so far as subjects of instruction are concerned, enough home talent would be in readiness for the service of the common schools. I believe that the National Council of Education has had such a plan in mind. Certainly if they will make a beginning the scheme ought not to fail for want of local coöperation. Here is a wide field for Christian, patriotic effort that has hardly yet been entered, a field particularly suited to the tastes and abilities of cultivated, high minded women, of whom a number are always to be found within a comparatively small radius in the country. The missionary cause never appeals in vain to these women for sympathy and substantial aid, and surely the school cause is none the less the cause of humanity.

Said Dr. Philip Lindsley,[1] in an address at the University of Nashville in 1826: "Until school keeping be made an honorable and a lucrative profession, suitable teachers will never be forthcoming in this free

[1] Dr. Philip Lindsley, president of the University of Nashville from 1825 to 1850, prior to which time he was vice president and president elect of the College of New Jersey, Princeton.

country." The surest way to make it honorable is to centre upon it the interest of those in every community who are themselves honorable and honored. At present the country school is too often an isolated, neglected object, and the teacher is depressed by the indifference of the rich and fortunate and the suspicions of the poor. Make the school an object of local pride and respect, and all this will be changed. What a city teacher derives from association with numbers engaged in the same business the country teacher will gain from the lively interest of the community in which he is placed. But it will not suffice that means should be found for securing to those who are to be the teachers of the common schools the benefits of a course of secondary instruction. Important as this may be it is not the chief part of a teacher's preparation. The art which he proposes to practise is one that depends very largely upon special training, i. e., that which is included in the professional course of the normal schools.

So far as it relates to teachers of common schools this special training involves two subjects: the methods to be employed in elementary education and the natures to be developed. The former, indeed, cannot be understood without an understanding of the latter, so that, as Dr. Youmans has well said: "Whatever questions of the proper subjects to be taught, their relative claims, or the true methods of teaching them may arise, there is a prior and fundamental inquiry into the nature, capabilities, and requirements of the being to be taught. A knowledge of the being to be trained, as it is the basis of all intelligent culture, must be the first necessity of the teacher."

It is easy to suggest the departments of knowledge which bear most directly upon this fundamental inquiry. Literature, history, biography, biology, sociology, whatever conduces to the understanding of human nature, whatever enlarges and quickens the sympathies, is of use here; and yet obviously of use by an appropriation of the material quite different from that which serves the purposes of the general scholar or the specialist.

The child is an epitome of man; "not one, but all mankind's epitome." The child's education will be an epitome of the progress of races; the mysterious, mutual action of mind and matter is a constant factor in the result. Man as he is manifested in literature, nations as they appear in history, life as it is revealed to the physiologist and to the psychologist, these are wisdom and power and doctrine to the teacher, but they are not likely to be turned to such account by the majority of persons who may be expected to serve as teachers in our rural schools. The ability to do this presupposes large experience, superior acumen, a peculiar coördination of faculties. Whatever art of teaching there is worthy of the name has been developed by persons thus endowed and communicated by them to others; in this way methods of procedure, founded upon and sanctioned by what is known of human nature, are extended and may penetrate to humble country school-houses and modify

the practice of teachers who have neither the opportunity nor the capacity to derive them at first hand. In other words, special training in the case of the teacher of common schools implies primarily and chiefly training by and practice under a master or mistress of methods.

"I know few things," says Mr. Fitch,[1] "more pathetic than the utterances of some headmasters at their annual conferences, at which one after another, even of those who have fought their way to the foremost ranks of their profession, rises up to say, 'We have been making experiments all our lives; we have learned much, but we have learned it at the expense of our pupils; and much of the knowledge which has thus slowly come into our possession might easily have been imparted to us at the outset and have saved us from many mistakes.'" A very little special training to start with is an inestimable advantage and the modicum can certainly be brought within the reach of candidates for rural schools, and must be brought within their reach if the schools are to fulfil the purposes ascribed to them in the eloquent utterances of statesmen and orators. For that large body of teachers who under existing circumstances cannot have the advantage of training in the normal schools, something of the influence of these schools may be secured by coördination and coöperation with teachers' institutes.

Without going into the details of a plan of operation, it will be enough to suggest that attendance for one session at a teachers' institute or summer normal school or class of instruction, as these auxiliary agents are named, where principles and methods of teaching are discussed and explained and practice lessons conducted, would be a valuable experience for one purposing to teach, and might with advantage be made a prerequisite for a teacher's license; that is, in the case of candidates who have had no other special training. The experiment has been successfully tried in a number of counties.

The example of Ontario in this matter is worthy of our attention.

The regulations in force in that province for insuring a measure of special training in the case of all teachers will be seen from the following statement from the report of the minister of education for the year 1882:

The regulations of the department, which have been in force since 1877, by virtue of the act passed in the session of that year, require, amongst other conditions for obtaining a third class teacher's certificate, that each candidate must have attended for one session at a county model school for professional instruction, and at its close be examined in the work of the session and upon subjects connected with the practice of teaching. If the candidate is successful in obtaining his professional certificate as the result of such attendance at the county model school, and has also passed the examination required in the non-professional subjects, including those prescribed for the high school intermediate, the county board of examiners may then lawfully grant such candidate a third class certificate, which will constitute him a public

[1] Lectures on teaching delivered in the University of Cambridge by J. G. Fitch, M. A.

school teacher of the third class, and thereupon legally qualified for employment by public school trustees.

Effects of right conception of the teacher's vocation.—Where there is a right conception of the teacher's vocation and a determination to employ only suitable persons for the work, the appointment of teachers will be secured against political and personal influences. The teacher will be chosen by merit proved by diplomas or examinations and secured in his position so long as he remains worthy of the trust.

Aids to progress.—Constant experience gives a familiarity with details and a skill in their treatment which no amount or kind of preparatory training can impart; hence, in whatever calling one engages, he derives great and peculiar assistance from a knowledge of the proceedings of others similarly employed. This it is that gives value to the conferences of local and national teachers' associations, in which every statement is borne in upon the hearer with the force and fervor of a personal narration.

It is, however, upon educational literature that teachers must depend chiefly for information which will guide in each new experience as it arises.

Fortunately this literature is becoming more and more abundant and valuable, whether regard be had to the discussion of principles and the relation of other sciences to the science of education or to the methods and observations of those who are engaged in the practical work.

I shall hope in the succeeding pages to be able to give some helpful suggestions as to the choice and use of this material, and also to awaken an interest in its use by such selections from the books and periodicals at my disposal as space and the scope of the subject permit.

THE TEACHER AT WORK.

A teacher's first day in the work is one of the most important in its consequences. Children are quick to detect uncertainty and confusion in their elders and woe to the teacher who does not know at the outset what he intends to do with them. Grown up people may make allowances, but children hold you mercilessly to their standard.

The following paper from the pen of Prof. E. C. Hewett, of the Illinois State Normal University, touches almost every point that concerns the first day and gives excellent advice upon all that it touches:

FIRST DAY IN SCHOOL.

It is important that the teacher should go to his first day's work furnished with all the knowledge he can possibly have concerning the house, the neighborhood, the pupils, and their previous progress. He may gain this knowledge by visiting the district, inspecting the school-house, conversing with the previous teacher, the directors, and others, and by inspecting the records of the pupils' progress and standing, if any have been kept. It ought to be required of every teacher that he should keep and leave in permanent form such records of his school as would give his successor fairly complete information concerning all pupils. In seeking knowledge concerning

his future school the teacher should not allow himself to be biased by neighborhood quarrels and jealousies, nor should he impress his patrons with the notion that he is overanxious to obtain their views on schools and education. He ought not to lead them to think that he is as pliable as the good natured teacher who was willing to teach that the earth is round or flat, just as his patrons should choose.

DEFINITE PLANS.

It is of great importance that the teacher enter the school-house on the first morning with a complete and definite plan of the work he proposes to do that day and of the order in which the several steps are to be taken. Scarcely anything will so deeply impress his pupils with the idea that he is master of his business.

PROMPTNESS.

The teacher should be on time every day, but it is especially important that he should be very prompt the first day. If he intends to be at the house fifteen minutes before school on other days, let him be there half an hour before school time this morning. The pupils are usually present on the first day, and the mere presence of the teacher may prevent the organization of mischievous schemes; besides, the furniture will need to be put in order, &c. He should greet his pupils cordially, but not show himself too anxious to become familiar. He should have his eyes wide open without seeming to be specially observant. If he detects some pupil whose look or manner seems to forebode trouble, it may be well to ask such a pupil pleasantly to assist in some of the work of preparation.

At the exact moment the signal for order should be given. If the house is furnished with a large bell a warning signal may be given about ten minutes before the time to begin, to be followed by another slight signal at the exact time to begin. It is not well to give signals by pounding on the house with a ruler or in other uncouth ways; this is not putting things to their appropriate use. Bells have been used as signals for ages; this is their chief purpose. Let it be remembered also that *the slightest signal is the best*, provided it is sufficient. A single, sharp tap of the bell means more than a prolonged ringing; it says, "Come now," but the prolonged ringing says, "Come after a while." A visitor once passed an hour in one of those schools that seem to work like clockwork without any effort on the part of anybody; no school ever really moves in that way, however. The visitor was especially impressed with the prompt and exact manner in which the classes arose and passed to recitation: there seemed to be no signal. After the session she asked a little girl belonging to one of the classes how the pupils knew when to rise and pass. "Why," says she, "did you not see the master move his thumb?"

ASSIGNING WORK.

As soon as school is in order work should begin. Two minutes or less is time enough for a teacher's inaugural: a few words of greeting, a hope for diligence, good conduct, and success, heartily spoken; this is enough. If devotional exercises are to be had on other mornings during the term, they should begin now. As soon as they are over some work should be given immediately to each pupil, except perhaps the very youngest.

Examples may be put on the board for those who have been through the "ground rules" of arithmetic, another set for those more advanced, a spelling lesson for the younger ones, some exact task for the classes in geography, &c. Let each pupil feel that a responsibility is put upon him. It makes little difference what the work is, only it must be *useful*, *reasonable*, and *definite*. Fix an exact time when the result will be called for, and do not neglect it when the time comes.

TAKING NAMES.

As soon as all are at work the teacher should proceed to take the names; this should be done with the least demonstration possible. If any of the pupils are work-

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ing at the board let them write their names beside their work, give the older pupils slips of paper on which to write their names, pass to the others and take their names in a whisper or low tone of voice. Be sure to spell all the names correctly. It is very essential that the teacher learn to put the names and their owners together as soon as possible. A pupil is impressed very differently when his teacher calls him promptly by name from what he will be if the teacher designates him as the boy on the back seat, the boy with a red necktie, &c. He feels that in the teacher's mind he has passed out of the limbo indicated by "boy" into the field of true personality. Besides, as the pupils are so familiar with their own names, they feel that it is an indication of weakness for a grown man, a teacher, to be ignorant of what is so easy to them.

To assist in learning the names it will be well for the teacher to be supplied with a plan or map of the school room; then, as soon as he ascertains a pupil's name, let him write it in the proper place on his plan. Of course the pupils will have been informed that they are to retain their present seats until they are changed by the teacher's order or permission. Having the plan before him, with all the names in their proper places, a careful glance from time to time at the name and face which belong together will soon associate them. He is a weak teacher in this respect who cannot learn to call each pupil in a school of forty promptly by name at the close of the third half-day.

TEMPORARY CLASSIFICATION.

It is not wise to attempt to classify completely at first. Adopt the classes of the previous term; put new pupils where they seem to belong, taking care not to class them too high; let the pupils distinctly understand that this is all for the present, and any changes will be made as soon as you think best to make them. Having thus arranged the classes, assign each a regular lesson. In the afternoon of the first day put a temporary program on the board and by the second day the school should be in regular order.

The temporary program to be placed on the blackboard in the afternoon of the first day necessitates a little previous experience in program making. It will be well for the teacher, before the day arrives, to borrow or invent a program that may serve his purpose. He may assume, for instance, the case of a school of thirty scholars, graded in five classes, but capable of being managed collectively in certain branches, and arrange for the same a scheme of study and a daily time table. This will serve him at the outset and form a basis for the final plan of his work.

DISTRIBUTION OF TIME AND SUBJECTS.

It ought to be unnecessary to insist upon programs and time tables as a means of regulating the work of rural schools, but for some reason their use has not become general in our schools. Indifference to the matter would seem to argue something more than ignorance on the part of teachers, but I am aware that many teachers who are only too anxious to avail themselves of all possible helps in their work neglect these particular helps from the feeling that they cannot be carried out.

Experience, however, proves that the very conditions which give rise to this feeling, viz, varying enrolment, irregular attendance, and the unequal attainments of pupils, are most easily corrected by a definite plan of operations. The objection sometimes urged that the use of programs leads to a lifeless routine is not confirmed by experience. The

following extract from the circular of Mr. Van Humbéeck, Belgian minister of education, dated July 20, 1880, is interesting in this connection:

Contrary to what has been for a long time the practice in all the countries which have at heart the development of popular education, the Belgian government, according to the law of 1842, did not deem it necessary to decree a plan of studies for the public primary schools. Some large cities, some provincial inspectors, had of their own motion formulated programs of study; but in the majority of the communes the teachers were left to be the sole judges of the manner of interpreting the intentions of the law on that subject. Experience has condemned this system; wherever the schools have followed definite programs, progress has been marked, while for the most part in the schools left to themselves routine has taken firm hold.

There are a few general principles which should be observed in the distribution of time and subjects.

The three rudimentary branches, reading, writing, and arithmetic, stand first in importance. Under ordinary circumstances reading requires most time in the lowest sections, and arithmetic, or some other branch of mathematics, most in the highest.

The length and succession of lessons should be determined by a consideration of the nature of the subjects and the age of the pupils as indicating their ability to bear the strain. Thus, the most exhausting lessons should be placed early in the day or directly after recreation and exercises requiring close thought should be alternated with those needing mechanical dexterity or the easy exercise of memory. From ten to twenty minutes is long enough for lessons with young children, and thirty or thirty-five minutes as a rule for those with older children. It is well to have one longer lesson in each school period for the most advanced classes. It is also necessary in organizing the classes to provide for changes of place and posture, which rest and refresh the body.

For the majority of teachers specimen courses of study and time tables will, probably, be more helpful than general directions, and a few are, therefore, inserted which will illustrate very fully those that have thus far been adopted in the United States:

COURSE OF STUDY AND DAILY PROGRAM PREPARED FOR THE COUNTRY SCHOOLS OF MICHIGAN.

FIRST SECTION (*Comprising first and second classes*).

Reading: First two books of series. Sight readings. Memorizing.

Spelling: Oral and written. Words from reading lessons and in common use.

Writing: On slate and board in connection with reading and spelling.

Numbers: Reading numbers to 1,000. Simple operations in the fundamental processes, written and oral. Roman notation.

Miscellaneous: Oral lessons daily. Home geography: Place, direction, the township and county, the globe. Language: Correct speech, correct forms, capitals, punctuation, &c.

Notes.

1. The work of this section will cover an average period of about two years.

2. Reading: Each class separately. Three exercises daily for first class. Two daily for second class. Careful attention should be given to the first lessons. Master each

lesson before advancing to another. Review several lessons each day and occasionally require pupils to read new lessons of the same grade at sight. Have pupils memorize choice selections from reader and other books. Teach the use of the diacritical marks as they appear in the lessons.

3. Spelling: Most of the spelling in this section should be in connection with, or preparatory to, the reading lesson and exercises. The spelling exercise of both classes united should be for review and for the purpose of correcting mistakes in spelling of individual pupils in the other exercises of the day.

4. Writing: Prepare slate work for pupils at their seats. Require pupils to practise writing figures as well as letters and words in script. Allow very little printing, and only at the very earliest stage.

5. Numbers: The whole section in one class. Have pupils learn to use the common signs of the arithmetical operations ($+$, $-$, $\times$, $\div$, $=$) and to write out the simple combinations of numbers on the slate and board. Present clearly the idea of decimal notation as far as 1,000. Practise pupils in reading numbers promptly and accurately. Work rapidly yourself and require rapid work from the pupils. Teach simple tables.

6. Miscellaneous: The whole section in one class. Ten minutes daily. Teach a few things simply and plainly. Do not attempt a wide range. Land, water, plants, animals, location, direction, distance. Common errors of speech. Capitals and marks used in their books.

SECOND SECTION (*Comprising third and fourth classes*).

Reading: Third and fourth books of the series. Select readings and recitations.

Spelling: Oral and written. Words from reading lessons and from spelling books.

Writing: Forms of letters. Copy books. Dictation—words and sentences.

Arithmetic: First book, completed. Fundamental processes, fractions, decimals, and compound numbers reviewed in advanced text book.

Geography: First book of series completed. Studies of maps and globes. Map drawing.

Language: Systematic oral lessons. Kinds of sentences. Parts of sentences. Common errors corrected. Written work.

Miscellaneous: Oral lessons daily. History—anecdotes of familiar characters and events. Physiology—health. Other subjects.

Notes.

1. The work of this section will occupy about three years of the course of an average pupil.

2. Reading: One exercise daily for each class, separately. Pay especial attention to catching and expressing the thought of the writer. Secure distinct articulation. Cultivate pleasant tones. Have pupils select from other books and bring to school choice selections to be read in class and memorized.

3. Spelling: The whole section united in one class. Much of the spelling work should be selected from the reading books. The regular spelling exercise should be mainly for test spelling by written reviews. Preserve lists of words commonly misspelled for test reviews.

4. Arithmetic: Each class should have one recitation daily. About one-third of the time of this section should be given to fixing fundamental principles in the first book of the series used, and the remaining two-thirds to mastering the work designated in the advanced book. Do everything thoroughly before it is passed by. Secure accuracy and rapidity in writing numbers from dictation. Practise rapid addition, factoring, &c. Teach the common measurements used in papering, carpeting, lumber, masonry, cord-wood, bins, boxes, cisterns, &c.

5. Geography: The whole section united in one class. Pupils should draw maps in outline, with not too full detail. Map drawing is a means rather than the end of

geographical study. Require occasional abstracts in writing as review exercises. Use outline or blackboard maps for class concert drill.

6. Language: The whole section united in one class, or each class reciting alternate days. The teacher should use some good work as a guide, not as a text book. Kinds of sentences—simple, compound, &c. Parts of sentences—subject, predicate. Parts of speech. Construction of sentences. Correct common errors. Brief written abstracts in connection with oral work.

7. Miscellaneous: The whole section in one class. Ten minutes daily. Conversational exercises on various subjects. The pupils should be required to reproduce these in writing at a subsequent time. Aim to create an interest in the subjects and to promote home readings upon topics of common interest. Occasional readings from newspapers and discussion of current events.

THIRD SECTION (*Comprising the fifth class*).

Reading: Fifth book of the series. Select readings. Recitations.
Spelling: Advanced spelling book.
Writing: Advanced copy books.
Arithmetic: Advanced text book completed. Business forms and methods.
Geography: Second book completed. Map drawing. Commercial geography.
United States History: Oral or text book, with special attention to the civil government of the United States and of Michigan.
Grammar: Text book completed. Letter writing. Composition. Paraphrasing.

Notes.

1. The work of this section will cover an average of about two years in the ordinary ungraded school course. So far as possible all the pupils should be together in their work and should understand that they form the advanced class in school.

2. Reading: This exercise should alternate with that in United States history, and, for a change, the text book in history will furnish many excellent reading lessons. Have good selections from the reader committed to memory and recited singly and in concert. Newspapers—current history.

3. Spelling: Words from the speller and frequent dictation exercises, with reference to capitals and punctuation. Encourage the use of dictionary for learning sounds of letters and pronunciation. Carefully review by lists of misspelled words as in second section.

4. Writing: In addition to copy books teach correct forms in ordinary writing. Require neatness and good order in all slate and blackboard work.

5. Arithmetic: Give special attention to business forms and short processes. Teach pupils to make out bills. Review the measurements commonly used in business and the industries. Cultivate rapidity and clearness of analysis. Thoroughly master the applications of percentage to ordinary business operations.

6. Geography: Use outline maps. Study comparative size of countries and States. Relative latitude of cities. River systems. Mountain systems. Climate. Routes of travel and commerce. Map drawing for study and use in geography and history.

7. United States history: If a uniform text book can be had, follow it. If not, teach topically, the pupils using such books as they have or can borrow. In connection with this subject teach orally the civil government of Michigan and of the United States.

8. Grammar: Follow the text book. Have frequent exercises in composition and letter writing. Teach correct forms. Occasional exercises in paraphrasing, reading, or other lessons and short stories.

GENERAL NOTE.

The course of study as here laid down contemplates the use of the following number of text books in the various subjects: In reading, five books, including the primer

or first book; in spelling, one book; in writing, any common school series of copy books; in arithmetic, two books; in geography, two books; in grammar, one book; in United States history, one book. In addition, the pupils should have slate and slate pencil, paper and lead pencil, and, if possible, a school dictionary. Those who use copy books should also have pen and ink.

The teacher should have some manual of object teaching, elementary works on all subjects (physiology, civil government, &c.), and other convenient books of reference.

The school room should be provided with dictionary, globe, outline maps, sufficient blackboard, crayons, and pointers, and such other conveniences as may be possible.

Classes should be heard on the following daily program:

Time.		First section.		Second section.		Third section.
Begin.	Length.	Class I.	Class II.	Class III.	Class IV.	Class V.
A. M. 9.00	*Min.* 5	OPENING.				
9.05	10	*Reading.*	Reading.	Arithmetic.	Arithmetic.	Arithmetic.
9.15	15	Printing.	*Reading.*	Arithmetic.	Arithmetic.	Arithmetic.
9.30	20	Printing.	Slate writing.	*Arithmetic.*	Arithmetic.	Arithmetic.
9.50	20	Numbers.	Numbers.	Arithmetic.	*Arithmetic.*	Arithmetic.
10.10	20	Numbers.	Numbers.	Geography.	Geography.	*Arithmetic.*
10.30	15	RECESS.				
10.45	15	*Numbers.*	*Numbers.*	Geography.	Geography.	Geography.
11.00	20	Writing.	Drawing.	*Geography.*	*Geography.*	Geography.
11.20	20	Reading.	Drawing.	Geography.	Geography.	*Geography.*
11.40	10	*Reading.*	Reading.	Arithmetic.	Arithmetic.	History or reading.
11.50	10	*Oral lessons.*	*Oral lessons.*	Arithmetic.	Arithmetic.	
P. M. 1.00	20	Reading.	Reading.	Reading.	Reading.	*History or reading.*
1.20	20	Reading.	Reading.	Reading.	*Reading.*	Grammar.
1.40	10	*Reading.*	Reading.	Reading.	Reading.	Grammar.
1.50	10	Printing.	*Reading.*	Reading.	Language.	Grammar.
2.00	15	Reading.	Reading.	*Reading.*	Language.	Grammar.
2.15	15	*Writing.*	*Writing.*	*Writing.*	*Writing.*	*Writing.*
2.30	15	RECESS.				
2.45	20	Spelling.	Spelling.	Language.	Language.	*Grammar.*
3.05	15	Spelling.	Spelling.	*Language.*	*Language.*	Spelling.
3.20	10	*Spelling.*	*Spelling.*	Spelling.	Spelling.	Spelling.
3.30	10	Copying.	Spelling.	*Spelling.*	*Spelling.*	Spelling.
3.40	10	Copying.	Copying.	Copying.	Spelling.	*Spelling.*
3.50	10	*Oral lessons.*	*Oral lessons.*	*Oral lessons.*	*Oral lessons.*	*Oral lessons.*

The *italic* type indicates recitations, the Roman type the times when classes should study particular subjects. Where recitations are indicated for two classes at the same time, they will recite together. Where two subjects are assigned to the same time, as in the case of history and reading in Class V, they should alternate, one coming one day, the other next. The study program is of as much importance as the recitations. Teach children to study.

COURSE OF STUDY AND DAILY PROGRAM PREPARED FOR THE COUNTRY SCHOOLS OF VIRGINIA.

A GRADED COURSE FOR PRIMARY SCHOOLS OF ONE TEACHER. (COMPLETED IN NINE FIVE-MONTH TERMS.)

First term.

1. Alphabet: By word and phonic method, followed by reading and spelling first half of First Reader.
2. Writing: Making letters and words on blackboard and slate.
3. Numbers: Counting objects; naming and making figures.
4. Oral instruction: Daily, not only on the regular branches, but on various topics, such as correct speech, objects, hygiene, music, morals, and manners; and this done on Friday especially.

Second term.

1. Reading and spelling: To the end of the First Reader. If Leigh's method be used more rapid progress may be made.
2. Writing: In tracing book and in copying short sentences from reader.
3. Arithmetic: Numeration begun, and addition; constructing and mastering the addition table; making some use of elementary text book, chiefly for objects and simple problems. Where Grube's method is employed these directions will not suit.

Third term.

1. Reading: Second Reader begun; spelling and vocal drill continued; meaning of words determined chiefly by their use in sentences constructed for the purpose by teacher and pupils.
2. Writing: First copy book and copying from reader. Blackboard and chart used in illustrating forms and principles of letters.
3. Arithmetic: Numeration continued; subtraction and multiplication; mental and written exercises alternating throughout the course; elementary text book in regular use.

Fourth term.

1. Reading: Second Reader finished, Third Reader begun; spelling and defining words in lessons.
2. Writing: Copy book, and dictation from reader to be copied by pupil.
3. Arithmetic: Division; fractions and decimals explained in connection with numeration, but not studied in detail; a few simple denominate tables learned; elementary book finished.

Fifth term.

1. Reading: Third Reader finished; phonic analysis and defining never given up.
2. Spelling: Spelling book begun.
3. Writing: Copy book and dictation; principles made familiar; particular letters taught.
4. Arithmetic: The complete arithmetic commenced. Mental and written constantly intermingled. Walton's tables used.
5. Geography begun: Oral; globe; points of the compass; practice in direction, location, and distance; local maps constructed; outline wall maps explained; geographic terms written, explained, and illustrated by objects or pictures.

Sixth term.

1. Reading: Fourth Reader begun; constant attention to enunciation and expression; use of dictionary as a book of reference taught.
2. Spelling: In spelling book and by all other means except dictionary.
3. Writing: Copy book, and the substance of reading lessons.
4. Arithmetic: Omitting puzzles, repetends, duodecimals, and, as they may be hereafter reached, the more complex and less used rules, such as alligation and the progressions.
5. Geography: Intermediate text book begun; map drawing practised throughout the course; good map studied carefully, though not in extreme detail; indifferent or *inaccurate maps not allowed.*

6. Grammar: The correction of errors in language used by pupils attended to always; systematic oral instruction begun.

Seventh term.

1. Reading: Fourth Reader finished and Fifth begun; exercise varied by skipping, and introduction of parallel reading.
2. Writing: Copy book and letter writing.
3. Arithmetic: Quickness and accuracy in performing the most practically useful operations to be sought rather than following curious details or subtle principles, or aiming at going over the whole book.
4. Geography: Text book expurgated of such details as may in after life be readily supplied as wanted, and geographical principles, forms, and outlines chiefly insisted upon.
5. Grammar: Elementary text book begun.

Eighth term.

1. Reading: Fifth Reader; small United States History (200 pages).
2. Writing: Practice; study of particular letters continued, and careful attention to details of posture, pen-holding, and careful formation of letters throughout the course.
3. Arithmetic: The mental effect attended to.
4. Geography: Intermediate geography finished and geographical questions considered in connection with reading history.
5. Grammar: Parsing, analysis (diagrams used).

Ninth term.

1. Reading: Fifth Reader and History of Virginia; spelling practised to the last.
2. Writing: Faithfully studied and practised to the end.
3. Arithmetic: Completed.
4. Geography: Geography of Virginia.
5. Grammar: Elementary, completed.

DAILY SCHOOL PROGRAMME.

8.50 to 9.00—Opening exercises.
9.00 to 10.00—Arithmetic.

1st grade (lowest)	recitation, 10 minutes.
2d grade	recitation, 10 minutes.
3d grade	recitation, 10 minutes.
4th grade	recitation, 10 minutes.
5th grade, 6th grade: On alternate days	recitation, 20 minutes.

10.00 to 10.40.—Writing.

1st grade	recitation, 10 minutes.
2d grade	recitation, 10 minutes.
3d grade, 4th grade, 5th grade, 6th grade	recitation, 20 minutes.

10.40 to 11.00.—Recess.
11.00 to 11.10.—Object lessons (for lower grades).
11.10 to 12.00.—Geography.

(First three grades occupied otherwise.)

4th grade	recitation, 15 minutes.
5th grade	recitation, 15 minutes.
6th grade	recitation, 20 minutes.

12.00 to 1.00.—Intermission.
1.00 to 2.40.—Reading and spelling.

1st grade	recitation, 15 minutes.

1.00 to 2.40.—Reading and spelling—Continued.

2d grade	recitation,	15 minutes.
3d grade	recitation,	15 minutes.
4th grade	recitation,	15 minutes.
5th grade	recitation,	20 minutes.
6th grade	recitation,	20 minutes.

2.40 to 2.50.—Recess.

2.50 to 3.40.—Grammar and composition.

4th grade	recitation,	15 minutes.
5th grade	recitation,	15 minutes.
6th grade	recitation,	20 minutes.

3.40 to 4.00.—Hygiene, morals, and manners.

4.00.—Dismission.

Arithmetic: During the period allotted to this subject let all the pupils in their several grades be engaged upon arithmetic. There will, we suppose, be six grades or classes; the lower grades must have the larger share of attention, and that every day. The higher classes, being smaller and composed of maturer minds, must have such attention as time will admit of. It may be necessary to confine the upper grades to two recitations a week. At the end of the period the subject must be changed, even if unfinished work should tempt its prolongation. The amount accomplished in the hour will depend on the skill of the teacher in keeping all the pupils at work, as well as on the number of grades. The use of Walton's tables or regents' questions will greatly shorten and improve arithmetical practice.

The first hour is selected for arithmetic, because then the mind is clearest. Head work is then changed to hand work, the subjective to the objective, while the nerves are still steady.

Of course, it is understood that the teacher will keep all the pupils not engaged in recitation employed in some appropriate work at seat or blackboard.

Writing: A good blackboard should hang where it can be seen by the whole school, and on this the teacher should correct the faults common among children in shaping their letters, and elucidate the principles. Charts will prove a valuable aid in teaching proper position for writing and the principles and forms of letters and figures. The same series of copy books should be used by all the pupils; but it will be an economy for each one to have some paper on which to experiment.

Object lessons may be made to counteract the abstract tendencies of book study.

Geography: This is one of the studies in which much instruction can be given in a wholesale way and in which the pupils can be so well occupied at seat or blackboard that they can receive an irregular amount of attention from the teacher without suffering seriously. Hence, geography is a flexible element which may give way partially under press of school work, especially in the higher classes, which may be confined to two lessons a week. Map drawing is a great economy of time, as well as an almost indispensable means of fastening information.

Reading and spelling: After the noon intermission comes the most important period of the day, which is allowed an hour and forty minutes. The lower grades must here, as elsewhere, receive daily care, and if the children of the lowest grade can reach home they should be first attended to and then dismissed for the day. If necessary, the highest classes may be heard only twice a week. There should be regular spelling books used, as well as spelling in connection with reading and blackboard exercises. Good spellers and readers should be made in preference to everything else, except character.

Grammar and composition can be taught in country schools only in a very simple and elementary way, owing to the brevity of the course; but what is attempted in this, as in everything else, should be thoroughly done.

Morals, manners, and health: The closing topics might properly have assigned to them a full period, for surely there are none in the program of superior importance or more identified with the work of education.

Friday may properly be used for reviewing the lessons of the week, rhetorical exercises, instruction in special subjects, such as vocal music, and for odds and ends.

COURSE OF STUDY AND DAILY PROGRAM PREPARED FOR THE COUNTRY SCHOOLS OF WISCONSIN.

SYNOPSIS OF THE COURSE OF STUDY.

This synopsis can be copied by the teacher or printed on a card, to be posted in the school room or distributed among the pupils for them to consult.

For the primary form.

1. Reading: Primer or chart, First and Second Readers.

2. Spelling: Oral and written spelling of all words in reading lessons and words from other sources.

3. Writing: First by print and then by script letters; write words and sentences from readers and those presented by teacher.

4. Language lessons: Proper use of familiar words, copying and making sentences, observing uses of capital letters and punctuation marks, reproducing stories told, and composing brief descriptions and simple narrations. Telling and asking sentences. Short selections memorized and recited.

5. Arithmetic: Ideas of numbers and decimal notation as far as 1,000; exercises in the four fundamental operations by Grube's method or equivalent; Roman notation to 100; proper fractions and familiar tables of denominate numbers.

6. Geography: Oral lessons on well known physical and other objects, on ideas of location, on uses and construction of maps, and on properties of the globe.

7. Drawing, optional: Straight lines in different positions, divisions of these lines, angles, and triangles.

For the middle form.

1. Reading: Third Reader and miscellaneous works for children; Webster's Dictionary used by pupils; recitation of short pieces.

2. Spelling: Oral, written, and phonic spelling of words in reading lessons or spelling book, and dictated by teacher. Copy selected paragraphs.

3. Language lessons: Continue former exercises; imperative and exclamatory sentences; simple, compound, and complex sentences analyzed; subject and predicate, and parts of speech studied; faulty language corrected.

4. Arithmetic: Processes made familiar; decimal notation as far as 1,000,000; practical examples often introduced; factoring numbers; common and decimal fractions; compound numbers in part; Roman notation to 1,000.

5. Geography: Oral instruction on local geography and the globe, continued; map and text book work in introductory geography on the grand divisions of the earth; instruction in map drawing.

6. History: Remarkable incidents or events in the history of the locality, town, county, and State related; historical stories about this country.

7. Writing: Analysis and combination of small and capital letters; full set of copy books of any system.

8. Drawing, optional: Exercises in straight lines continued; square and oblong, squares with triangles, and combinations of the square; exercises in curved lines and in curved-line figures.

For the upper form.

1. Reading: Fourth Reader and selected reading; declamations and reading essays.

2. Spelling: Mainly by written method; spell words in reading lessons and spelling book; learn rules for spelling and common abbreviations.

3. Language lessons and grammar: Study the ordinary text books; attend to faulty constructions in syntax; parsing and analyzing; write compositions and letters.

4. Arithmetic: Commercial accounts, compound numbers, ratio and proportion, percentage, and square and cube root.

5. Geography: Intermediate or common school geography completed. Special attention to Europe, United States, and Wisconsin.

6. United States history: Study by topic as preparatory to civil government.

7. Constitutions of the United States and Wisconsin: Use ordinary text books and oral instruction.

8. Writing: Business forms, letter writing, and keeping accounts.

9. Drawing, optional: Use text book. Supply materials. Inventive drawing, with straight-lined figures and with complex curved lines. Leaf, flower, vase, and other figures, with duplicates, halves, thirds, &c. Miscellaneous figures.

10. Vocal music, optional: Exercises by all the pupils in singing simple melodies, practising the scale, reading notes, and learning spirited songs.

DAILY PROGRAM.

Recitations.					Study and work.		
Commence.	Class.	Form.	Text books. Branch.	Text books. Book.	Primary form.	Middle form.	Upper form.
9.00	Opening and general exercises.						
9.15	A	I	Reading.	Primer.	B and C study.	D study.	E study.
9.25	B	I	Reading.	First.	A print, C study.	D study.	E study.
9.35	C	I	Reading.	Second.	A print, B write.	D study.	E study.
9.50	D	II	Reading.	Third.	A and B recess, C st.		E study.
10.10	E	III	Arithmetic.	Higher.	Slate adding.	G study.	
10.35	Recess.						
10.50	F	I	Arithmetic.	Oral.		G study.	H study.
11.05	G	II	Arithmetic.	Rudiments.	A print, B and C st.		H study.
11.25	A	I	Reading.	Primer.	B and C study.	I study.	H study.
11.35	H	III	Geography.	Higher.	A print, B and C st.	I study.	
12.00	Nooning.						
1.00	I	II	Language.	Lessons.	A print, B and C st.		J study.
1.15	B	I	Reading.	First.	A print, C study.	L study.	J study.
1.25	C	I	Reading.	Second.	A and B slate work.	L study.	J study.
1.40	J	III	Reading.	Fourth.	Work with objects.	L study.	
2.00	A	I	Reading.	Primer.	B and C draw.	L study.	M study.
2.10	Writing and drawing.						
2.30	Recess.						
2.45	K	I	Geography.	Oral.		L study.	M study.
2.55	L	II	Geography.	Smaller.	A and B study.		M study.
3.10	M	III	Grammar.	Larger.	Slate work.	N study.	
3.35	N	II	Spelling.	Reader or speller.	A and B draw.		O study.
3.45	O	III	Spelling.	Reader or speller.	C dismiss.	D study.	
4.00	Dismission.						

NOTE.—When a class is formed for the study of United States history or the constitutions in a school where recitations are not conducted in all portions of the other branches there need be no difficulty in assigning it a place in the program. But when the school is organized with all the classes above indicated, that in the history or the constitutions can recite at the afternoon recess.

These programs have been prepared by officers and teachers of large experience in the schools for whose use they are intended; they do not comprise more work or a greater variety of work than is required in the majority of the schools, and they enable us to arrive at a pretty clear understanding of what may be accomplished in the schools under favorable conditions. The Michigan course is intended to cover seven school years; the Virginia, nine five-month terms; the Wisconsin, nine school years.

OBSERVATIONS SUGGESTED BY THE PROGRAMS AND TIME TABLES.

With a scheme of work thus formulated the teacher sees many things at a glance. Evidently the school must be instructed collectively in every branch that admits of it. Writing and drawing can be managed in this way; also, singing, when it is taught, certain language lessons, and brief exercises upon morals and manners, and gymnastics or drill exercises. The plan of bringing the recitations of different classes in the same study into the same hour presents several advantages. With this arrangement the instruction may be given in common, so far as the attainments of the different classes allow; one or two classes may be directed to work at times without instruction, in order that the attention of the teacher may be concentrated upon other classes needing extra instruction. If any occurrence interrupts the routine of the day, less confusion results when the omitted study is the same for all scholars than if several branches of study are affected, and by the arrangement proposed the teacher is saved from the wearing effects of incessant change of subjects and too frequent repetitions of the same subject.

The recitations of the younger classes, it will be seen, occupy only a few minutes, ten or fifteen at a time. This accords very well with the views of those who have made special observations to determine the power of continuous attention in childhood; on the other hand, it will be noticed that these same younger classes must spend much time in assigned work or study without help or oversight.

Thus, by the Michigan daily program, class I is to spend each day as follows: Reading, 30 minutes; numbers, 15 minutes; oral lessons, 20 minutes; writing, 15 minutes; spelling, 10 minutes; total, 1 hour 30 minutes; recess, 30 minutes; assigned work, without teachers, viz, studying, copying, &c., 3 hours and 55 minutes. The distribution of time is about the same for class II and the corresponding classes in the other programs, so that when all the classes provided for on the program are present in the school the younger children must drag out many weary, unprofitable hours. The slate work which is assigned is interesting and valuable, provided the teacher has the time to inspect and comment upon it; otherwise it becomes a mere form of idleness.

Probably every teacher who has been through the experience of teaching a country school of various grades has wished at the end of the

first week that he could lop off the primer class; that done, the work would be manageable. To instruct intermediate classes requiring about the same treatment, and to give a few advanced scholars the help which they need, is not impossible; but add the beginners wanting constant attention, appealing for it with the persistence and confidence of their years, and the situation seems desperate. Unless the beginners are a large majority of the pupils, which is seldom the case, the best that can be done with them is not satisfactory. In this connection the following extract from the last report of the committee of council on education, England, is significant:

The methods of instruction for children over and under seven years of age are very different and cannot be efficiently carried on in the same room. Every school, therefore, except the very smallest, requires a separate department for infants; and the code now in force (1883) contains special provisions for securing that proper arrangements are made for the purpose. Of the 863,817 infants in average attendance during the past year, 565,224 were found in infant schools, 139,746 in the infant classes of mixed schools under school mistresses, and as many as 158,847, we regret to say, in similar classes under the very unsuitable charge of male teachers.

DISTRIBUTION OF TIME AND SUBJECTS IN FOREIGN PROGRAMS.

The following programs show how carefully the work of rural schools in certain foreign countries is systematized and offer some interesting points of comparison with those of our own schools:

FRANCE.

The following program shows the course and hours of study (arranged according to regulations of July 27, 1882) in a school with only one teacher, in the department of Aube:

In the following program the dotted lines indicate the lessons given by the teacher. The white spaces correspond to the work of the pupil alone, like a study or written exercise, or also to a recitation before a pupil teacher in the lower class.

The arrangement indicated is not unchangeable, but is to be followed as far as possible so as not to favor one course at the expense of another. The teacher may, if he chooses, unite the three classes for any one lesson.

The lesson commences always with the correcting of a preceding lesson on the same topic.

Five minutes before entering, pupils form into rank and are inspected. They enter and leave the school room singing.

Saturday is taken up with a review of the studies of the week.

Hours.	Monday, Wednesday, and Saturday. Upper class.	Monday, Wednesday, and Saturday. Middle class.	Monday, Wednesday, and Saturday. Lower class.	Tuesday and Friday. Upper class.	Tuesday and Friday. Middle class.	Tuesday and Friday. Lower class.
A. M. 8.00	Reading.	Reading.	Reading.	Tuesday same as Monday. Friday: In the three classes, one-half hour of singing; then one-half hour of object lessons.		
8.20			Numbers.			
8.40			Writing.			
8.50			Instruction in morals.			
9.00						
9.10	Morals.	Morals.	Drawing.	Morals.	Morals.	Drawing.
9.25	Recreation.			Recreation.		
9.40	Arithmetic.	Arithmetic.	Numbers.	Tuesday: Metric system and geometry.	Tuesday: Metric system and geometry.	Geometry.
9.50			Writing.			Numbers.
10.15			Numbers.	Friday: Metric system and agriculture.	Friday: Metric system and agriculture.	Reading.
10.25						
10.40	Writing.	Writing.	Reading. Civic instruction.	Gymnastics for boys; sewing for girls.		
11.00	Manual training.			Manual training.		
11.20	Recreation.					
P. M. 1.00	French.	French.	Language exercises.	French.	French.	Reading.
1.15			Writing.			Writing.
1.35			Spelling exercises.			Spelling exercises.
2.00	Drawing.	Drawing.	Drawing.	Tuesday: Physics.		
2.15			Reading.	Friday: Natural history.		
2.30	Recreation.			Recreation.		
2.45	History.	History.	History.	Geography and civic instruction.	Geography and civic instruction.	Geography.
3.00			Reading.			Reading.
3.20		Miscellaneous exercises or writing.	Copying of a reading lesson.		Miscellaneous exercises or writing.	French.
3.45	Monday and Wednesday: Gymnastics. Saturday: Singing.			Tuesday: Singing. Friday: Gymnastics.		
4.00						

Résumé of studies of the week.

Studies.	Upper class.	Middle class.	Lower class.
	h. m.	*h. m.*	*h. m.*
Reading	4.00	4.00	5.55
Writing	1.00	2.15	4.50
French	5.00	5.00	3.15
History	3.00	2.15	45
Geography and civic instruction	2.00	1.30	1.20
Arithmetic	4.00	4.00	3.10
Geometry	30	30	30
Drawing	1.30	1.30	2.50
Physical and natural sciences	1.00	1.00	1.00
Agriculture	30	30	....
Object lessons	30	30	30
Morals	2.05	2.05	1.00
Singing	1.00	1.00	1.00
Gymnastics	1.25	1.25	1.25
Manual training ... { Boys	1.40	1.40	1.40
Manual training ... { Girls	3.05	3.05	3.05
Recreation	2.30	2.30	2.30
Total	30.00	30.00	30.00

The following program shows the course and hours of study for the school year 1882–'83 in a school for boys, for girls, or a mixed school, in the department of Meurthe and Moselle:

MORNING.

Classes.	8 to 8.15 (15 minutes).	8.15 to 8.50 (35 minutes).	8.50 to 9.30 (40 minutes).	9.30 to 9.45 (15 minutes).	9.45 to 10.30 (45 minutes).	10.30 to 11 (30 minutes).	11 o'clock.
		MORALS.	READING.		ARITHMETIC, GEOMETRY, &C.	WRITING, DRAWING, SINGING.	
Elementary: First division (5 to 7 years).	Pupils enter. Inspection as to neatness. Roll call.	Reading: Stories, maxims, allegories, fables, &c.; oral reviews; lessons common to both divisions.	Naming of letters; sounds; articulation.	Recreation. (Art. 7 of regulations.) Pupils enter and leave in order, singing.	Numeration; calculation; addition; subtraction, intuitive processes.	Writing on slate or copy book; elements of letters.	Pupils leave in order, singing.
Second division (7 to 9 years).			Syllabication; common words; reading at sight.		The four operations; metric system; application.	Small letters, large letters, and ordinary writing. Tuesday, drawing.	
Middle (9 to 11 years).		Conversations by the master; reading, with explanations; practical exercises.	Reading at sight, with explanations; oral reviews.		Whole numbers and decimals; fractions; metric system; applications and problems.	Ordinary writing; Wednesday and Saturday, drawing; Tuesday, singing.	
Upper (11 to 13 years).		Coördinate lessons; social morals.	Reading with expression; analysis of pieces read.		Theoretical and practical arithmetic; notions of accounts, of geometry, of measurements, of levelling.	Running hand, round hand, between round and Italian hand; Wednesday and Saturday, drawing; Tuesday, singing.	

AFTERNOON.

Classes.	1 to 1.15 (15 minutes).	1.15 to 1.55 (40 minutes).	1.55 to 2.30 (35 minutes).	2.30 to 2.45 (15 minutes).	2.45 to 3.30 (45 minutes).	3.30 to 4 (30 minutes).	4 o'clock.
	Pupils enter. Inspection as to neatness. Roll call.	READING AND GRAMMAR.	RECITATIONS, FRENCH COMPOSITION.	Recreation. (Art. 7 of regulations.) Pupils enter and leave in order, singing.	HISTORY, GEOGRAPHY, CIVIC INSTRUCTION, &C.	ELEMENTS OF PHYSICAL SCIENCES, GYMNASTICS, &C.	Pupils leave in order, singing.
Elementary: First division (5 to 7 years). Second division (7 to 9 years).		Reading: Naming the letters, sounds, articulation. Reading: Syllabication, common words, reading at sight.	First ideas of orthography. Language exercises. Recitation: Grammar; corrections on blackboard.		History: Instruction by anecdotes. Mental review ½ hour. History: Principal facts; some historical portraits; first notions of geography; mental review for ½ of an hour.	Written exercises or drawing. Written exercises. (Gymnastics on the days designated).	
Middle (9 to 11 years).		Grammar: Explanation of rules; dictation in common with the upper class.	Recitation: Abstract; correction; grammatical analysis.		History, geography, civic instruction.	Elements of natural and physical science, Monday, Wednesday, Friday; gymnastics and industrial training, Tuesday, Saturday.	
Upper (11 to 13 years).		Grammar: Explanation of rules; dictation and correction.	Recitation: Abstract; logical analysis; reading by the master from easy literary subjects.		History, geography, civic instruction; common law, and elements of political economy.	Elements of natural and physical sciences, Monday, Wednesday, Friday; gymnastics and industrial training, Tuesday, Saturday.	

NOTE.—In the schools for girls and mixed schools, sewing is taught Wednesday and Saturday from 3 to 4 o'clock.

The following program shows the hours and course of study in a mixed school of Noviant-aux-Prés (Toul, France):

MORNING.

Hours of school exercises.	Monday.			Tuesday.			Wednesday.			Friday.			Saturday.		
	Lower class.	Middle.	Upper.	Lower class.	Middle.	Upper.	Lower class.	Middle.	Upper.	Lower class.	Middle.	Upper.	Lower class.	Middle.	Upper.
5 minutes before 8.	Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.		
8 to 9.	Calculation.	Mental arithmetic.		Calculation.	Mental arithmetic.		Calculation.	Mental arithmetic.		Calculation.	Mental arithmetic.		Calculation.	Mental arithmetic.	
9 to 9.15.	Reading (assistant).	Metric system.		Reading (assistant).	Elements of geometry.		Reading (assistant).	Metric system.		Reading (assistant).	Elements of geometry.		Reading (assistant).	Metric system.	
9.15 to 9.35.	Drawing.			Singing.			Drawing.			Singing.			Drawing.		
9.35 to 9.45.	Recreation: Gymnastic and military exercises.			Recreation: Gymnastic and military exercises.			Recreation: Gymnastic and military exercises.			Recreation: Gymnastic and military exercises.			Recreation: Gymnastic and military exercises.		
9.45 to 10.10.	Morals.			Morals.			Morals.			Morals.			Morals.		
10.10 to 10.35.	Reading (master).	Reading (assistants).		Reading (master).	Reading (assistants).		Reading (master).	Reading (assistants).		Reading (master).	Reading (assistants).		Reading (master).	Reading (assistants).	
10.35 to 10.55.	Writing.			Writing.			Writing.			Writing.			Writing.		
10.55 to 11.	General correction of written exercises. The master, chalk in hand, points out on the blackboard the mistakes found in each written exercise.														

AFTERNOON.

Hours of school exercises.	Monday.			Tuesday.			Wednesday.			Friday.			Saturday.		
5 minutes before 1.	Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.			Inspection as to neatness.		
1 to 2.	French language.			French language.			French language.			French language.			French language.		
2 to 2.20.	History and civic instruction.			Geography and civic instruction.			History and civic instruction.			Geography and civic instruction.			History and civic instruction.		
2.20 to 2.35.	Reading (assistant).	Nat. and phys. sciences.		Reading (assistant).	Agriculture.		Reading (assistant).	Nat. and phys. sciences.		Reading (assistant).	Agriculture.		Reading (assistant).	Nat. and phys. sciences.	
2.35 to 2.45.	Recreation.	Gymnastic and military exercises.		Recreation.	Gymnastic and military exercises.		Recreation.	Gymnastic and military exercises.		Recreation.	Gymnastic and military exercises.		Recreation.	Gymnastic and military exercises.	
2.45 to 3.	Singing.			Morals.			Singing.			Morals.			Singing.		
3 to 3.25.	Written exercises.	To make a fair copy.		Written exercises.	To make a fair copy.		Written exercises.	To make a fair copy.		Written exercises.	To make a fair copy.		Written exercises.	To make a fair copy.	
3.25 to 3.45.	Reading (assistant).	Reading (master).		Reading (assistant).	Reading (master).		Reading (assistant).	Reading (master).		Reading (assistant).	Reading (master).		Reading (assistant).	Reading (master).	
3.45 to 4.	General exercises reviewing all the instruction of the school, especially hygiene, morals, the industries, agriculture, physical and natural sciences, &c.														

OBSERVATIONS.—The exercises in reckoning (calculation) are placed at the beginning of the day on account of the mental effort required. The instruction in morals also covers any incident happening in the class. The exercises in the French language take place at the commencement of the class, as they necessitate mental effort. Industrial training is given Tuesdays from 11 to 12 o'clock, and Thursdays from 9 to 11.

The following program shows the course and hours of study in the Montoliver School (a mixed school, with one teacher and an assistant):

MORNING.

7 to 8.	8 to 9.10.	9.10 to 9.30.	9.30 to 9.45.	9.45 to 10.15.	10.15 to 11.
Inspection with reference to neatness. Pupils enter.	French language; grammar; explanation of lessons; exercise by the pupils; application of the same and orthography.	Instruction in morals. Reading.	Leaving school room. Recess. Roll call.	Writing. Drawing (Tuesday and Saturday).	Arithmetic.

AFTERNOON.

12.45 to 1.	1 to 2.	2 to 2.30.	2.30 to 2.45.	2.45 to 3.15.	3.15 to 4.
Inspection as to neatness. Pupils enter.	History of France. Geography. Civic instruction.	Reading.[1]	Leaving school room. Gymnastics. Roll call.	Natural and physical sciences. Singing (Tuesday and Saturday).	French exercises. Abstracts. Composition. General exercises on selected topics.

[1] Twice a week an exercise in recitations.

OBSERVATIONS.—The instruction is to be simultaneous as far as possible and the lessons are to be given in common in the two upper classes. The lower class is under an assistant. Sewing every day from midday to 1 o'clock.

SWITZERLAND.

The following shows the branches taught and hours of instruction in schools of first and second grade, in the canton of Valais, in 1878:

Branches.[1]	Divisions. I. Groups I, II.	Divisions. II. Groups III, IV, V.	Divisions. III. Groups VI, VII, VIII.
	Hours.	*Hours.*	*Hours.*
Religion and biblical history	5	5	4
Mother tongue: reading written language	8	11	11
Penmanship	4	5	3
Arithmetic, book-keeping	3	5	7
Singing	1	1	1
Geography	......	2	2
History of the fatherland	......	1	2
Hours of instruction per week	21	30	30

PRUSSIA.

Following are the subjects taught and time given to each a week in the common schools of Prussia in 1872. The one class school has three divisions, suited to the age and capacity of the children. In a four class school the two middle classes have two divisions each; in a six class school each class has two divisions:

One class school.

Branches.	Lower grade.	Middle grade.	Upper grade.
	Hours.	Hours.	Hours.
Religion	4	5	5
German (talking, reading, and writing)	11	10	8
Arithmetic	4	4	4
Doctrine of space	......	......	1
Drawing	......	1	2
"Realien" (geography, natural history, and history)	......	6	6
Singing	1	2	2
Gymnastics, handwork	......	2	2
Hours of instruction per week	20	30	30

[1] Gymnastics are given out of school hours. In the schools for girls four hours a week are devoted to sewing. In the mixed schools a special teacher instructs in needlework, &c.

Two class school.

Branches.	Lower class.		Upper class.	
	Second division.	First division.	Second division.	First division.
Religion	4	4	4	4
German (speaking, reading, writing)	11	8	8	8
Arithmetic	4	4	4	4
Doctrine of space	....	....	....	2
Drawing	....	2	2	2
"Realien" (geography, natural history, and history).	....	6	6	8
Singing	1	2	2	2
Gymnastics, handwork	2	2	2	2
Hours of instruction per week	22	28	28	32

Three class school, with two teachers.

Branches.	Third class.	Second class.	First class.
Religion	2	4	4
German (speaking, reading, writing)	7	8	8
Arithmetic, doctrine of space	2	4	5
Drawing	....	1	1
"Realien" (geography, natural history, history)	....	4	6
Singing	1	1	2
Gymnastics, handwork	....	2	2
Hours of instruction per week	12	24	28

Three class schools, with three teachers.

Branches.	Third class.	Second class.	First class.
Religion	4	4	4
German (speaking, reading, writing)	11	8	8
Arithmetic	4	4	4
Doctrine of space	....	....	2
Drawing	....	2	2
"Realien" (geography, natural history, history)	....	6	8
Singing	1	2	2
Gymnastics, handwork	2	2	2
Hours of instruction per week	22	28	32

LOWER AUSTRIA.

The following table gives the subjects and time devoted to each a week in an undivided one class school, kept all day.

The pupils are formed in three groups: the first covers the first and

second school years; the second covers the third and fourth school years; and the third the fifth, sixth, seventh, and eighth school years.

Branches.[1]	First group. First and second school years.	Second group. Third and fourth school years.	Third group. Fifth, sixth, seventh, eighth school years.
Religion	2	2	2
Language	12	10	10
Arithmetic	4	4	4
Natural history	....	2	2
Geography and history	....	....	2
Penmanship	....	2	2
Drawing and geometric forms	....	2	3
Singing	1	1	1
Gymnastics	....	2	2
Hours of instruction during the week	19	25	28

ASSIGNMENT OF WORK BY TIME PERIODS.

The program and daily time table having been settled, it is desirable that an estimate should be made of what each class may be expected to accomplish in a certain period of time, as five weeks or ten weeks. So many circumstances affect the result that it is impossible to apply the same limits to different schools or even to assign limits to which the classes of one school shall be rigidly held. The idea is carried out in a few schedules before me. The course of study published in the report of the Massachusetts board of education for 1877–'78 represent three years' work divided into semiannual periods.

The course of study prepared for the schools of Aurora, Ill., by the superintendent, Hon. William B. Powell, divides the work in each branch into periods of time of varying duration; although the course is designed for graded schools, in this respect it would be found useful in ungraded schools.

We may note here that the distribution of time and subjects as advised is fully provided for in German schools. Just before the Easter examinations the school programs are published and distributed among teachers and parents. There is also a complete time table of lessons, copies of which are expected to be in the hands of every pupil; and full details are given regarding the nature and quantity of the work to be accomplished in the course of the year by each class.

REGISTERS.

Of equal importance with the program and time table is the register. This should be neatly and carefully kept, should give an exact state-

[1] The number of hours for woman's handiwork is to be decided upon by the school officers.

ment of the enrolment of scholars, the number of days' attendance for each, the number of days' and half days' absence, and the record of conduct and lessons. A register with marginal blanks for notes is best, as the teacher can then record any observation desired at the moment it occurs to his mind and in connection with the topic to which it relates. Thus the reason for absence or tardiness, the cause of failure in lessons, the teacher's general estimate of the character, abilities, health, and progress of individual scholars, may be noted, forming a much more valuable record than any mere percentage estimate of recitations. Registers of this sort, well and accurately kept, are a means of stimulating pupils, and indispensable in the effort to give continuity to the work of the schools. The register should be furnished by the committee, placed in some safe repository during vacations, and handed over to the teacher at the beginning of each school term.

THE WORK OF TEACHING.

The school having been organized and the plan of study adopted, everything is ready for the work of teaching.

A teacher's suggestions to teachers.—On this point Mr. Landon[1] remarks as follows: "Here we have naturally three things to consider: the person taught, the materials for teaching, and the methods of using these materials;" and he proceeds to set these forth in the following happy and suggestive manner:

In order to mould correctly the faculties of the child, it is necessary, first of all, to know something of the laws which regulate the growth and action of these powers. A knowledge of mental science and physiology (as has been noted) will here be of much service to the teacher, but no amount of book knowledge can compensate for the want of careful daily observation of the pupils themselves. To treat them successfully, the teacher must know his children; know them individually, each with his peculiarities of intellect and temperament, his weaknesses, and his strong points, so that when the opportunity arises the teacher may say the right word and do the right thing, may adjust both his teaching and discipline, as far as possible, to meet the needs of the case. Thus, constant experimental study of the pupils themselves cannot be too strongly urged; and the larger the amount of knowledge and experience of this kind the teacher possesses, the more free from error will his practice be.

The subjects of instruction which furnish the knowledge or material which the teacher has to make use of will vary to some extent with the school and the grade of advancement of the pupils. No matter what the subjects, it is absolutely necessary that the teacher should know clearly and well those portions he intends to teach. Nor must he, if he would do this well, by any means stop here. Unless he knows much more than he expects to teach, he will find that his lessons will be stiff, formal affairs, lacking elasticity, variety, and freshness, and marred frequently by want of interest or illustration. He will be unable to answer many of the questions on side issues which are always likely to be asked by children, and he will lack confidence in himself accordingly. Lastly, he will find his teaching a source of dissatisfaction to himself, from the consciousness that he is not doing his work so thoroughly and skilfully as he might do.

The greater the amount of accurate information he has at his command, the more useful, easy, and pleasant will, cæteris paribus, the work become both to himself and his pupils. With a reserve of capital he will have no fear of bankruptcy and will

[1] School Management, by Joseph Landon, lecturer on school management, &c., in the Training College, Satley, England.

be able to cash readily any draft which may be presented to him. On this account the teacher should never give up his private reading, which will not only give knowledge, but keep alive his sympathy with the pupils' difficulties; and, above all men, he should learn to go through the world with his eyes open. Unless he is constantly accumulating new information, his mind will not only become like a stagnant pool, but he will find that what he possesses is gradually evaporating. There is no state of equilibrium here: *non progredi est regredi*.

For the teacher to know his subjects well from an examination point of view is one thing; to know them in a form suitable for presentation to his scholars is another; while to be acquainted with the best *methods* of communicating the knowledge he possesses—the principles which should govern his teaching, the various devices he should make use of, and the share of the work he should exact from his pupils—is still a third. He must not only know the rules of method which should guide him in his art, but should also be acquainted with the principal laws of mind and body upon which his methods depend. The art of teaching is by no means easy to acquire thoroughly. "The art," says Lord Bacon, "of well delivering the knowledge we possess to others is amongst the secrets left to be discovered by future generations." We have no doubt advanced in many ways since his day, but no *teacher* will say but what an immense deal remains yet to be done, both in way of observation and experiment and of organization of results. Attentive study and careful practice will do much; but the teacher needs to be very careful how far he considers either his knowledge of, or skill in, his art perfect.

Here, we see, is the ideal of a progressive teacher, progressing constantly along all the lines started in the preparatory course of training. With reference to the persons to be taught, Mr. Landon very justly observes, as every teacher will admit, that no amount of book knowledge can compensate for the want of careful daily observation of the pupils themselves. Nevertheless, there are many books that afford helpful suggestions as to the observations which the teacher should make and the interpretation to be put upon them.

In respect to the work of original observation, Pestalozzi and Fröbel are particularly suggestive. Their writings are indeed seldom accessible to English readers, but their overflowing sympathy with child nature may be caught from the writings of their friends about them, as, for instance, Hermann Krüsi's Life of Pestalozzi, His Work and Influence, and Mme. Marenholz-Bülow's Reminiscences of Fröbel. The reader will not derive very definite information from these books; they are valuable for the dispositions they illustrate and the spirit they inspire.

A little pamphlet published recently by Edwin Chadwick, esq., C. B., should be mentioned here. It is entitled "Educational Progress: A memoir of the late Horace Grant, esq., as a successful experimentalist to determine the receptivity of children in primary education." It is a fragmentary work, but gives an excellent idea of how a teacher should go about the study of the mental states of childhood and the kinds of records by which teachers may add to the common stock of knowledge on this subject.

In introducing certain passages from Mr. Grant's manuscript Mr. Chadwick observes:

Next to the deductions obtained by study and experimental trials as to the quality

of the subject matters of instruction adapted for reception by infantile minds, are those as to the varying capacities of voluntary attention and its limits in time on each occasion of its exercise.

The common practice proceeds on the assumption that the capacity of attention of young children has scarcely any definite limits, and that so long as their faces can be kept directed towards the teacher, with the appearance of attention, he may go on and on, pouring in instruction which will be received in the mind and retained and preserved there for use, and that if the attention fail in appearance it may be effectually revived by the coercion of the tongue or the rod, and that "children may be made to attend" for any length of time, whether "they like it or not," as long as they may be kept sitting still, and though every muscle may be aking with suppressed activity. Now, the trials made upon his studies brought out most clearly the principle that the mental capacity to the continued reception of new ideas is a faculty of slow growth and has at all times narrower and more definite limits than is commonly supposed.

Speaking of very young children, Mr. Grant says: "At first the exercises should not be allowed to take up more than a minute or two at a time; their duration should gradually extend to five minutes, and, as the child advances, to the extent of ten minutes. Some of the oldest children may feel interested as long as a quarter of an hour. It will be sufficient if these exercises are done once a day. Occasionally they may be dropped entirely for a week or ten days, and with older pupils for a month." With further training and growth the capacity of attention may be advanced to twenty minutes; and he found experimentally that even with older children lessons requiring mental effort should rarely exceed half an hour.

Wishing to gather the results of experience on this point, I obtained from Mr. David Donaldson, the head master of the Free Church Training College (Mr. David Stow's school) at Glasgow, the following statement:

My experience as to the length of time children closely and voluntarily attend to a lesson is: Children of from 5 to 7 years of age, about 15 minutes; children of from 7 to 10 years of age, about 20 minutes; children of from 10 to 12 years of age, about 25 minutes; children of from 12 to 16 or 18 years of age, about 30 minutes. I have repeatedly obtained a bright voluntary attention from each of these classes for five, ten, or fifteen minutes more, but I observed it was always at the expense of the succeeding lesson; or, on fine days, when the forenoon's work was enthusiastically performed, it was at the expense of the afternoon's work.

By teachers of high pretensions, lessons are carried on greatly and grievously in excess of such limits; but when the results are examined they show that, after given limits have been exceeded, everything forced upon the brain only tends to drive out or to confuse what has been previously stored by it.

Mr. Grant's experience made him earnestly impressive on this principle. "It is of the greatest consequence," he says, in his Manual of Arithmetic for Young Children, "that the pupils should take pleasure in arithmetic, as, indeed, in all other matters taught;" "the lesson should, therefore, invariably cease before they become inattentive or fatigued. The constant variety of occupation and almost incessant bodily motion which young children absolutely require should also be carefully attended to. By duly regarding these remarks, the intelligent instructor will convert a usually hateful task into an agreeable pastime." Again, in his Second Stage of Arithmetic for Advanced Pupils, he states that "the teacher will also find that the mind can sustain more labor for a longer time when all the faculties are employed than when a single faculty is continually exerted; but it should be impressed on the teacher in the most earnest manner that no error is more fatal than to overwork the mind of a child. Other errors of discipline may be corrected; the effects of this end only with life."

Bain's Education as a Science opens up some important lines of observation that have not been so clearly presented by any other writer, and we have, at last, from another English author, James Sully, a work entitled Outlines of Psychology, which has these qualities to recom-

mend it for the purpose under consideration: it brings information on the powers and functions of the mind down to date, the matter is treated with judgment and classified with discrimination, and the work bears out fully the expectation excited by the following announcement in the preface:

I have sought to give a practical turn to the exposition by bringing out the bearings of the subject on the conduct and cultivation of the mind. With this object I have ventured to encroach here and there on the territory of logic, æsthetics, and ethics; that is to say, the practical sciences which aim at the regulation of the mental processes. Further, I have added special sections in a separate type dealing with the bearing of the science on education.

PEDAGOGIC PRINCIPLES.

The distinction made by Mr. Landon between the principles that should govern teaching and the devices or methods by which instruction is conveyed and the faculties of the pupils trained form a prominent topic of consideration in the professional courses of normal schools. Many teachers who have never had their attention called to these distinctions, but who by dint of perseverance have worked out excellent methods for themselves, would derive encouragement and stimulus if they could see how their practice is related to established principles. The principles of pedagogics, it is true, cannot be learned like a string of isolated facts and become thenceforth a potent, vitalizing force in the art of teaching. They are derived from the experimental study of a particular class of phenomena and not to be well apprehended except by experience, but all teachers are more or less familiar with these phenomena, and it is likely to happen here, as in respect to other subjects of thought, that the formal expression of the principles is all that is necessary to transform the results of experience into systematized knowledge. For example, a teacher learns by experience the value of drill and review exercises without perhaps being at all able to account for their effects. The philosopher generalizes the experience thus: "Exercise involves repetition, which, as regards impressions received by the mind, ends in clearness of perception." The teacher recognizes the truth in its new guise. What before were unrelated experiences stored up in his memory assume new meaning as illustrations of a principle of action applicable always and with invariable results in the business that he has in hand. He begins to have a personal and joyful sense of the truth that "it is the possession of principles that gives mental life, courage, and power."

Mr. Joseph Payne,[1] an eminent educator and distinguished professor of the science and art of education in the College of Preceptors, London, recognized the importance of setting forth the principles he desired to inculcate in the minds of the teachers under his training in the form of distinct propositions, and accordingly published for the use of the

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[1] When, in 1872, a professorship of the science and art of education (the first of its kind in England) was established by the College of Preceptors, Mr. Payne was unanimously elected to occupy the chair. He died April 30, 1876.

members of his class a paper which can hardly fail to be interesting and valuable to all teachers, more especially as it seldom happens that writers on pedagogics attempt to present even the principles that are well established apart from the discussion of mind on the one hand or the description of methods on the other.

Mr. Payne's paper is here quoted entire:

I. *General principles.*—(1) Every child is an organism, furnished by the Creator with inherent capabilities of action and surrounded by material objects which serve as stimulants to action.

(2) The channels of communication between the external stimulants and the child's inherent capabilities of action are the sensory organs, by whose agency he receives impressions.

(3) These impressions or sensations, being incapable of resolution into anything simpler than themselves, are the fundamental elements of all knowledge. The development of the mind begins with the reception of sensations.

(4) The grouping of sensations forms perceptions, which are registered in the mind as conceptions or ideas.[1] The development of the mind, which begins with the reception of sensations, is carried onward by the formation of ideas.

(5) The action and reaction between the external stimulants and the mind's inherent powers, involving processes of development[2] and implying growth, may be regarded as constituting a system of natural education.

(6) A system of education implies: (1) An educating influence or educator; (2) a being to be educated, or learner; (3) matter for the exercise of the learner's powers; (4) a method by which the action of these powers is elicited; and (5) an end to be accomplished.

(7) In the case before us, the educating influence or educator is God, represented by nature or natural circumstances; the being to be educated, or learner, a child; the matter, the objects and phenomena of the external world; the method, the processes by which this matter is brought into communication with the learner's mind; and the object or end in view, intellectual development and growth.

In view of the different agencies concerned in effecting this intellectual education and of their mutual relation, we arrive at the following:

II.—*Principles of natural education.* (1) Nature, as an educator, recognizes throughout all his operations the inherent capabilities of the learner. The laws of the learner's being govern the educator's action and determine what he does and what he leaves undone. He ascertains, as it were, from the child himself how to conduct his education.

(2) The natural educator is the prime mover and director of the action and exercise in which the learner's education consists.

(3) The natural educator moves the learner's mind to action by exciting his interest in the new, the wonderful, the beautiful, and maintains this action through the pleasure felt by the learner in the simple exercise of his own powers, the pleasure of developing and growing by means of acts of observing, experimenting, discovering, inventing, performed by himself, of being his own teacher.

(4) The natural educator limits himself to supplying materials suitable for the exercise of the learner's powers, stimulating these powers to action and maintaining their action. He coöperates with but does not supersede this action.

(5) The intellectual action and exercise in which the learner's education essentially consists are performed by himself alone. It is what he does himself, not what is done for him, that educates him.

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[1] By "conception" or "idea" is meant the trace, residuum, or ideal substitute which represents the real perception.

[2] The term "development" is here employed for that unfolding of the natural powers of which "growth" is the registered result.

(6) The child is therefore a learner who educates himself under the stimulus and direction of the natural educator.

(7) The learner educates himself by his personal experience; that is, by the direct contact of his mind at first hand with the matter, object, or fact to be learned.

(8) The mind in gaining knowledge for itself proceeds from the concrete to the abstract, from particular facts to general facts or principles, and from principles to laws, rules, and definitions, and not in the inverse order.

(9) The mind in gaining knowledge for itself proceeds from the indefinite to the definite, from the compound to the simple, from complex aggregates to their component parts, from the component parts to their constituent elements, by the method of investigation. It employs both analysis and synthesis in close connection.

(10) The learner's process of self education is conditioned by certain laws of intellectual action. These are (1) the law of consciousness; (2) of attention, including that of individuation, or singling out; (3) of relativity, including those of discrimination and similarity; (4) of retentiveness, including those of memory and recollection; (5) of association or grouping; (6) of reiteration or repetition, including that of habit.

(11) Memory is the result of attention and attention is the concentration of all the powers of the mind on the matter to be learned. The art of memory is the art of paying attention.

(12) Ideas gained by personal experience are subjected by the mind to certain processes of elaboration, as classification, abstraction, generalization, judgment, and reasoning. These processes imply the possession of ideas gained by personal experience and they are all performed by the youngest child who possesses ideas.

(13) The learner's knowledge consists in *ideas*, gained from objects and facts by his own powers, and consciously possessed—not in *words*. The natural educator, by his action and influence, secures the learner's possession of clear and definite primary ideas. Such ideas, so gained, are necessarily incorporated with the organic life of the learner's mind and become a permanent part of his being.

(14) Words are the conventional signs, the objective representatives of ideas, and their value to the learner depends on his previous possession of the ideas they represent. The words, without the ideas, are not knowledge to him.

(15) Personal experience is the condition of development, whether of the body, mind, or moral sense. What the child does himself, and loves to do, forms his habits of doing; but the natural educator, by developing his powers and promoting their exercise, also guides him to the formation of right habits. He therefore encourages the physical development which makes the child healthy and robust, the intellectual development which makes him thoughtful and reasonable, and the moral development which makes him capable of appreciating the beautiful and the good. This threefold development of the child's powers tends to the formation of his bodily, mental, and moral character, and prepares him to recognize the claims of religion.

(16) Education as a whole consists of development and training and may therefore be defined as "the cultivation of all the native powers of the child, by exercising them in accordance with the laws of his being, with a view to development and growth."

The above general facts or principles, being the results of an analytical investigation into the nature of the child as a thinking being and into the processes by which his earliest education is carried on, constitute the science of natural education.

But, as it is the same mind which is to be cultivated throughout, natural education is the pattern or model of formal education, and consequently the science of natural education is the science of education in general.

The formal educator or teacher, therefore, who professes to take up and continue the education begun by nature is to found his scheme of action upon the above principles, and in supplementing and complementing the natural educator's work he is to proceed on the same lines. He is not to intrude modes of action which contravene and neutralize the principles of natural education.

A teacher of ordinary intelligence will have little difficulty in understanding the principles here formulated, and the endeavor to see how far they have entered into his practice and how far they are confirmed by results cannot fail to make his daily work more interesting to himself and more profitable to his pupils.

METHODS.

The teacher in whom the results of training are combined with a native instinct for teaching will inevitably employ good methods, but even such a teacher will profit by a constant study of the subject as exemplified in the practice of other good teachers. Untrained novices generally go about their work in a haphazard way, unworthy of the name of method, or fall into traditional methods that are worse than none.

Page on methods.—Mr. D. P. Page, in his work Theory and Practice of Teaching, gives accurate descriptions of the most common of these mischievous modes of procedure. Two will readily be recognized by the titles he applies to them, namely, "the pouring in process," or lecturing to children upon every subject that occurs in the course of a lesson, and "the drawing out process," or the method by leading questions.

The latter, which is apt to be most attractive to a class of amiable, superficial instructors, is well shown by the following amusing incident:

I may further illustrate this drawing out process by describing an occurrence which, in company with a friend and fellow laborer, I once witnessed. A teacher whose school we visited called upon the class in Colburn's First Lessons. They rose, and in single file marched to the usual place, with their books in hand, and stood erect. It was a very good looking class.

"Where do you begin?" said the teacher, taking the book.

PUPILS. On the eightieth page, third question.

TEACHER. Read it, Charles.

CHARLES (reads). "A man being asked how many sheep he had, said that he had them in two pastures; in one pasture he had eight; that three-fourths of these were just one-third of what he had in the other. How many were there in the other?"

TEACHER. Well, Charles, you must first get one-fourth of eight, must you not?

CHARLES. Yes, sir.

TEACHER. Well, one-fourth of eight is two, isn't it?

CHARLES. Yes, sir; one-fourth of eight is two.

TEACHER. Well, then, three-fourths will be three times two, won't it?

CHARLES. Yes, sir.

TEACHER. Well, three times two are six, eh?

CHARLES. Yes, sir.

TEACHER. Very well. (A pause.) Now, the book says that this six is just one-third of what he had in the other pasture, don't it?

CHARLES. Yes, sir.

TEACHER. Then, if six is one-third, three-thirds will be three times six, won't it?

CHARLES. Yes, sir.

TEACHER. And three times six are eighteen, ain't it?

CHARLES. Yes, sir!

TEACHER. Then he had eighteen sheep in the other pasture, had he?

CHARLES. Yes, sir!

TEACHER. Next, take the next one.

At this point I interposed and asked the teacher if he would request Charles to go through it alone. "Oh, yes," said the teacher. "Charles, you may do it again." Charles again read the question and looked up. "Well," said the teacher, "you must first get one-fourth of eight, mustn't you?" "Yes, sir." "And one-fourth of eight is two, isn't it?" "Yes, sir." And so the process went on as before till the final eighteen sheep were *drawn out* as before. The teacher now looked round with an air which seemed to say, "Now I suppose you are satisfied.

The benefits of good methods are not confined to the pupils; they stimulate and cheer and invigorate the mind of the teacher himself, a fact which is brought out quite forcibly by Professor Tyndall. Having described his method with a class in geometry, he adds:

Some of the most delightful hours of my existence have been spent in marking the vigorous and cheerful expansion of mental power when appealed to in the manner I have described.

It would, of course, be impossible to describe all, or even a few, of the methods of which teaching admits, nor, if this were done, would it be possible to supply with the description the judgment and discrimination necessary for their use. It will be readily agreed that the teacher should form for himself a definite purpose and a definite plan of procedure for each lesson and that he should arrange his matter in such a way that the instruction shall proceed from what the pupil knows of the subject to what he does not know.

Lecturing or direct address may be employed to convey information; questioning may be so managed as to set the pupil upon discovering truth for himself. Both methods have their place in the work.

The programs previously given in these pages contain some general suggestions as to methods that will be found helpful, and by reference to the list of books appended to this circular it will be seen that the subject has been very fully treated by both American and foreign writers. It need hardly be added that some one of the books mentioned, as, for instance, Swett's Methods of Teaching, is a sine qua non for the teacher.

If we could be certain that such a book was in every teacher's hand, we could dismiss the whole subject of method, saying, only read it and follow its working models. But, as every teacher does not possess such a book and many are too skeptical as to the advantage to be derived therefrom to purchase one, we may hope to excite a desire on their part to know further of this matter by setting forth a few methods for the conduct of elementary lessons, which accord with sound principles of education and which have the approval of hundreds of teachers who have used them.

PROSPECTUS PREPARED FOR THE SCHOOLS OF BOSTON.

In this connection the following scheme of study is worthy of attention. It was prepared for the primary and grammar schools of Boston and published in the Forty-second Annual Report of the Massachusetts Board of Education, 1877–'78. As a course of study it is not applicable to ordinary ungraded schools, but it embodies suggestions as to the development of subjects that may be useful to any teacher.

Outline course of study—Primary schools.

Class.	Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.	Drawing.	Music.	Physical exercises.	Recreation.	Miscellaneous.
VI.	*1⅔ hours a week.* Oral lessons. Purpose: to accustom pupils to express what they know in sentences. Material: reading lessons, pictures, plants, and animals, or whatever the ingenuity of the teacher may suggest.	*2½ hours a week.* Simple conversational studies of familiar plants, animals, and things; to distinguish *form, color, and prominent qualities*. Simple poetry recited (throughout the course).	*10 hours a week.* Reading from black board, chart, and a reader of a proper grade.	*1⅔ hours a week.* A few of the simplest script letters, viz, *i, u, n, m, t, d, e, o*, &c. Short, easy words, names of familiar objects, combining the letters learned. Arabic figures.	*2 hours a week.* Numbers from 1 to 10. 1. Adding and subtracting. 2. Arabic figures. 3. Ordinal numbers.	*2 hours a week.* As in Rules and Regulations, Chap. XXVIII. Names, positions, and relationship of straight lines. Combinations of lines to make figures. Their division into equal parts. Drawing from memory and dictation of lines in defined positions. Combinations and arrangements of points and short lines in geometric forms. Ruling lines of given length. Measuring length of given lines. Blackboard. Slates.	*1 hour a week.* As in Rules and Regulations, Chap. XXIX. First 14 pages of First National Music Reader by rote. Scales by numerals and syllables. Position of body and formation of sounds.	*50 minutes a week.* Not less than twice each session, some simple, pleasing exercise in concert.	*⅚ hour a week.*	
V.	*1⅔ hours a week.* Same as in Class VI.	*2½ hours a week.* Same as in Class VI, with new material. Simple talks about the human body and hygiene. In connection with number lessons, coins, from 1 to 10 cents.	*10 hours a week.* Reading from a reader of a proper grade. Spelling by sound and by letter some easy, common words from the reading lessons.	*1⅔ hours a week.* All the small script letters combined into words, as in Class VI. Arabic figures.	*2 hours a week.* Numbers from 1 to 10. 1. Multiplying and dividing, with results in figures. 2. Relations of numbers from 1 to 10. (See subjects for "oral instruction.")	*2 hours a week.* Curved lines explained. The simple curve. Combination of curved with straight lines. Illustrate plane geometric definitions of lines and figures by rule and measure. Simple forms from memory and dictation. Rearrangements of exercises in design. Blackboard. Slates.	*1 hour a week.* Notation. Time, beating time, and signs of expression. Practice in writing characters used in music. Rote songs at option of teacher. Chart No. 2.	*50 minutes a week.* Same as in Class VI.	*⅚ hour a week.*	

Outline course of study—Primary schools—Continued.

Class.	Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.	Drawing.	Music.	Physical exercises.	Recreation.	Miscellaneous.
IV.	*2 hours a week.* Same as in preceding classes.	*2¾ hours a week.* Same as before, introducing freely comparisons between like and unlike and studying less familiar plants, animals, and things. With number lessons, pint, quart, gallon; quart, peck, bushel.	*8 hours a week.* Reading from a reader of a proper grade. Supplementary reading. Spelling, by sound and by letter, words from the reading lessons, and other familiar words.	*2 hours a week.* Capitals and small letters; short, easy words; names of pleasing, familiar objects; pupil's name.	*2½ hours a week.* Numbers from 1 to 20. 1. Combinations of 10 with numbers smaller than 10. 2. Adding, subtracting, multiplying, and dividing, with results in figures. 3. Relations of numbers from 1 to 20. 4. Roman numerals to XX. 5. Metre and decimetre.	*2 hours a week.* Curved lines explained. The compound curve. Outlines of vases and pitchers, illustrating compound curves. Arranging simple leaves to fill geometric forms by repetition. Symmetry, or balance of parts, explained. Definitions of regular plane forms in words and by illustrations. Dictation and memory. Blackboard. Slates.	*1 hour a week.* Review, and advance to end of Chart No. 12. Rote songs, pp. 15, 16, and 17. Writing of notes of different values, and combining them into measures.	*50 minutes a week.* Same as in Classes V and VI.	*½ hour a week.*	*½ hour a week.*
III.	*2 hours a week.* Oral exercises as in preceding lessons. Pupils to write the sentences made in their oral exercises so far as they are able.	*2¾ hours a week.* Same as before. Grouping of animals by habits, traits, and structure, and of objects by form and qualities. Lessons in size and distance by simple measurements, inch, foot, yard.	*8 hours a week.* Reading from a reader of a proper grade. Supplementary reading. Spelling as before, written and oral.	*2 hours a week.* Letters, words, and short, simple sentences; the proper use of capitals. Roman numerals.	*2½ hours a week.* Numbers from 1 to 100. 1. Combinations of tens, and of tens with smaller numbers. 2. Adding, subtracting, multiplying, and dividing numbers from 1 to 50, with results in figures. 3. Relations of numbers from 1 to 50. 4. Roman numerals to L. 5. Square and cubic decimetre.	*2 hours a week.* Review work of previous classes. Proportion and size. Testing accuracy by scale. Designing new combinations of old forms. Symmetry and repetition further illustrated. Enlarging from cards. Reducing from blackboard. Blackboard and slates.	*1 hour a week.* Review, and advance to end of Chart No. 15. Exercise upon sounds of the scale by numerals, syllables, and pitch names. Rote songs. Writing scale degrees under dictation.	*50 minutes a week.* Same as in preceding classes.	*½ hour a week.*	*½ hour a week.*

II.	*2 hours a week.* Same as in Class III.	*2½ hours a week.* Observation of less obvious qualities; tints and shades of color. Study of strange animals from pictures, to infer mode of life from structure or structure from mode of life. Simple lessons on weights and divisions of time. Talks about the human body and hygiene, continued. Fables, anecdotes.	*7 hours a week.* Reading from a reader of a proper grade. Supplementary reading. Spelling as before.	*2 hours a week.* Letters, words, and sentences, from dictation and from the blackboard. Sentences made in the language lessons to be used for writing exercises.	*3½ hours a week.* Numbers from 1 to 100. 1. Adding, subtracting, multiplying, and dividing, with results in figures. 2. Relations of numbers from 1 to 100. 3. Roman numerals to C. 4. Litre and decalitre; decametre.	*2 hours a week.* Drawing on paper in books. Review work of Classes V and VI on paper. Even quality of lines. Subjects of lessons in previous classes repeated in regular order.	*1 hour a week.* Review, and advance to end of No. 20. Scale practice by singing and writing. Rote songs.	*50 minutes a week.* Twice in the forenoon and once in the afternoon.	*½ hour a week.*	*½ hour a week.*
I.	*2 hours a week.* Same as in Classes II and III.	*2½ hours a week.* Work of Class II continued. Complementary colors. Harmonies of colors. Plants and animals gathered into families. Vegetable, animal, and mineral products distinguished. Observation of the qualities and mechanism of things as adapted to their use.	*7 hours a week.* Reading from a reader of a proper grade. Supplementary reading. Spelling as before.	*2 hours a week.* Words and sentences. Sentences used in language lessons will furnish material for exercises. The proper form of dating, addressing, and signing a letter; also the correct method of superscribing an envelope.	*3½ hours a week.* Numbers from 1 to 1,000 1. Combinations of hundreds, and of hundreds with smaller numbers. 2. Adding, subtracting, multiplying, and dividing numbers from 1 to 144, with results in figures. 3. Relations of numbers from 1 to 144. 4. Adding and subtracting, multiplying and dividing numbers from 144 to 1,000, no multiplier or divisor larger than 10 being used. 5. Roman numerals to M. 6. Centimetre; gram and kilogram.	*2 hours a week.* Drawing on paper in books. Review work of Classes IV and III on paper. [For further description, see program of instruction issued annually.]	*1 hour a week.* Charts from 21 to 36, inclusive. Rote songs. Writing of scales in different keys.	*50 minutes a week.* Same as in Class II.	*½ hour a week.*	*½ hour a week.*

Opening exercises, ½ hour a week. Recesses, 2½ hours a week.

Outline course of study — Grammar schools.

CLASS VI.

Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.
3 hours a week.	*2½ hours a week.*	*6 hours a week.*	*2 hours a week.*	*4 hours a week.*
Oral and written exercises in the use of language as the expression of thought. Exercises the same in kind as those of the primary schools, adapted to the capacity of pupils of this class. Letter writing.	Elementary studies in natural history, Plants — May to November. Animals — November to May. Qualities and properties of objects. Talks about trades, occupations, and articles of commerce. Poetry recited.	Reading from a reader of a proper grade. Supplementary reading throughout the course. Spelling from the reading and other lessons; chiefly written exercises.	Two books each half year. Blank books at alternate lessons.	1. Combination of thousands; writing and reading integers. 2. Relations of tenths, hundredths, and thousandths to unit; writing and reading decimals to thousandths. 3. Addition and subtraction of integers to millions, of decimals to thousandths, and of United States money. 4. The units of United States money, with relations to one another, also of liquid and dry measure. — Oral exercises with simple numbers, to precede and accompany written arithmetic.

CLASS VI — Continued.

Geography.	Drawing.	Music.
2 hours a week.	*1½ hours a week.*	*1 hour a week.*
Oral lessons with the use of the globe and maps, as soon as the class is prepared for them.	(As in Rules and Regulations, Chap. XXVIII.) Drawing on paper in books. Review lines, angles, and figures on large scale. Division of lines into equal and unequal parts. Figures inscribed within and described about figures. Elementary design. Dictation and memory. Proportion of parts to whole design.	(As in Rules and Regulations, Chap. XXIX.) Music charts, second series. Exercises and songs in the first 20 pages of the charts and in the first 33 pages of second music reader. Continued practice in writing.

CLASS V.

Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.
3 hours a week.	*2½ hours a week.*	*6 hours a week.*	*2 hours a week.*	*4 hours a week.*
Same as in Class VI.	Subjects of Class VI continued. Talks about common phenomena. Stories, anecdotes. Poetry recited.	Reading from a reader of a proper grade, or its equivalent. Spelling as before.	Two books each half year. Blank books at alternate lessons.	1. Multiplication and division of integers, of decimals, and of United States money. 2. The units of avoirdupois weight and of troy weight, with their relations. — Oral exercises.

Outline course of study—Grammar schools—Continued.

CLASS V—Continued.

Geography.	Drawing.	Music.
2 hours a week.	*1½ hours a week.*	*1 hour a week.*
Oral lessons continued, with such use of the text book and such map drawing as is appropriate.	Drawing on paper in books. Tangency of curved with curved and curved with straight lines. Review compound and simple curves on large scale. Abstract curves. Details of historical ornament. Conventionalism explained and illustrated. Repetition on an axis and around a centre. Geometric views of objects. Dictation and memory. Elementary design, with conventional leaves. Geometrical drawing with compasses. Definitions, and eight problems.	Charts from No. 21 to 40, inclusive. Chromatic scale, both in singing and writing. Songs at option of teacher. Rules of breathing.

CLASS IV.

Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.
3 hours a week.	*2½ hours a week.*	*5 hours a week.*	*2 hours a week.*	*4 hours a week.*
Same as in Classes V and VI.	Elementary natural history, continued. Common metals and minerals. Useful woods. Stories from mythology and ancient history. Poetry and prose recited.	Reading from a reader of a proper grade, or its equivalent. Spelling as before.	Two books each half year. Blank books at alternate lessons.	1. Factors, measures, and multiples. 2. Common fractions. 3. The units of long, square, and solid measure, with their relations. 4. Decimal fractions reviewed and completed. — Oral exercises.

CLASS IV—Continued.

Geography.	Drawing.	Music.
3 hours a week.	*1½ hours a week.*	*1 hour a week.*
Study of the earth as a globe, with reference to form, motions, parallels, meridians, zones (with their characteristics), winds, currents, and the life of man as varied by climate and civilization. The physical features of the grand divisions studied and compared; with map drawing.	Drawing on paper in books. Filling of geometric shapes with conventional ornament. Details of historical ornament, unsymmetrical. Abstract curves based on the spiral. Conventional leaves. Objects in profile. Dictation and memory. Elementary design. Processes of mechanical repetition. Geometrical drawing with compasses. Problems 9 to 44.	Charts (third series). Scale and staff intervals. Singing in different keys up to three sharps and four flats. Practice of the first 20 numbers in charts and first 22 pages of Third Reader.

Outline course of study — Grammar schools — Continued.

CLASS III.

Language.	Oral instruction.	Reading and spelling.	Writing.	Arithmetic.
3 hours a week.	*2 hours a week.*	*3 hours a week.*	*1½ hours a week.*	*4 hours a week.*
Same continued. Grammar begun: The parts of speech; analysis of simple sentences.	Elementary natural history continued. Physiology begun. Stories of life in the Middle Ages. Poetry and prose recited.	Reading from a reader of a proper grade, or its equivalent. Spelling as before.	Two books each half year. Blank books at alternate lessons.	1. Metric system. 2. Percentage: (*a*) Simple interest. (*b*) Discount. — Oral exercises.

CLASS III — Continued.

Geography.	History and civil government.	Physics.	Drawing.	Music.
2½ hours a week.	*2½ hours a week.*	*1 hour a week.*	*1½ hours a week.*	*1 hour a week.*
Physical and political geography of the countries of the grand divisions begun; with map drawing.	United States history to July 4, 1776.	Outlines of physics, to be taught as far as practicable by the experimental method.	Drawing on paper in books. Horizontal, vertical, and central repetition compared. Details of historical ornament. Common objects. Enlargement and reduction of ornamental details. Symmetry of unsymmetrical lines. Elementary design from historic details. Dictation, memory, and design combined in single lesson. Geometrical drawing with compasses. Problems 45 to 73.	Charts. Reverse charts of third series to be completed. Songs in various keys. Transposition from one key to another. Vocal culture continued.

CLASS II.

Language.	Oral instruction.	Reading and spelling.	Writing.
3 hours a week.	*3 hours a week.*	*3 hours a week.*	*1 hour a week.*
Exercises in writing continued. Business letters. Grammar: The subdivisions of the parts of speech; inflections of nouns, pronouns, verbs, adjectives, and adverbs; analysis of easy complex and compound sentences. The rules of syntax illustrated by familiar examples.	Physiology. Biographical and historical sketches. Poetry and prose recited.	Reading from a reader of a proper grade, or its equivalent. Spelling as before.	One book each half year. Blank book alternately.

CLASS II — Continued.

Arithmetic.	Geography.	History and civil government.	Physics.
4 hours a week.	*2½ hours a week.*	*3 hours a week.*	*1 hour a week.*
1. Percentage continued. (*a*) Commission and other simple applications. (*b*) Profit and loss. (*c*) Partial payments. (*d*) Compound interest. 2. Ratio and proportion. 3. Compound numbers completed. — Oral exercises.	Physical and political geography of the countries of the grand divisions completed; with map drawing.	United States history completed and reviewed.	Outlines of physics continued.

Outline course of study—Grammar schools—Continued.

CLASS II—Continued.

Drawing.	Music.
1½ hours a week. Drawing on paper in books. Historical objects. Subtlety of curvature. Elementary design from given subjects. Enlargement and reversing of objects. Model and object drawing: 1st, from copy; 2d, from object. The ellipse, perspective of the circle. Regular forms and irregular natural forms based on them. Geometric basis of objects of use. The cone and cylinder, and objects based on them. The sphere, spheroid, and ovoid, and objects based on them.	*1 hour a week.* Fourth music reader. Solfeggios from page 50 to 78. Also, triad exercises from page 79 to 84. Frequent change of parts. Songs at option, but with exclusion of rote singing. Continuation of writing exercises and transposition.

CLASS I.

Language.	Oral instruction.	Reading and spelling.	Writing.
3 hours a week 1st half year. *3½ hours a week 2d half year.* Exercises in writing as in the preceding classes, with the application of grammar to ordinary English.	*1 hour a week.* Conversational lessons on topics and allusions connected with the studies. *1 hour a week.* Declamation or recitation.	*2½ hours a week.* Reading from a reader of a proper grade, or its equivalent. Spelling as before.	*1 hour a week.* Commercial and miscellaneous forms. Blank book alternately.

CLASS I—Continued.

Arithmetic.	Geography.	History and civil government.	Physics.
3½ hours a week 1st half year. *4 hours a week 2d half year.* 1. Powers of numbers. 2. Square root and its common applications. 3. Mensuration. 4. Reviews. [After completing the reviews, cube root and its applications, equation of payments, and exchange may be studied.] Oral exercises.	*3 hours a week 1st half year.* General reviews. Astronomical and physical phenomena, and political and commercial relations, more carefully studied. Maps of the grand divisions of the United States and of Great Britain drawn from memory.	*3 hours a week.* History of England. Constitution of United States; of Massachusetts.	*1½ hours a week.* Outlines of physics continued.

CLASS I—Continued.

Book-keeping.	Drawing.	Music.
2 hours a week 2d half year. Single entry: Day book, cash book, and ledger to be kept. Practice in the use of common business forms.	*1½ hours a week.* Drawing on paper in books. Elaborate details of historic ornament compared. Natural foliage copied with pen and ink. Elementary design from given subjects in given shapes. Half tinting. Memory drawing of designs. Model and object drawing: 1st, from copy; 2d, from object. The perspective of parallel lines in rectangular objects. Cube, prisms, and pyramids, and objects based on them. Botanical analysis of plants for designs.	*1 hour a week.* Fourth music reader. Solfeggios from page 50 to 78. Also triad exercises from page 79 to 84. Frequent change of parts. Songs at option, but with exclusion of rote singing. Continuation of writing exercises and transposition.

Physical exercises, 50 minutes a week. Every class to practise in concert proper physical exercises not less than five minutes each session. (Regulations, sec. 234.)
Sewing, 2 hours a week for girls. (Regulations, sec. 235.)
Opening exercises, half hour a week.
Recesses, 1 hour 40 minutes a week.

FIRST LESSONS IN READING.

I am assured that many teachers cling to the A, B, C, and the a b ab, of the old primers as if there was a divine unction in the sounds and the symbols, and yet this is the method of teaching reading against which nature protests, as do all teachers who are influenced by nature or reason. The child learns to speak by hearing and repeating whole words. These words he associates with the appearance or forms of objects. Thus he knows one face as mamma's and another as papa's; he calls a certain animal dog and a certain object chair; and continuing this natural process in his early school days he will master his primer and First and Second Readers by painless effort.

This method of teaching reading is illustrated in the following model lesson as given in the manual prepared for the Aurora schools:

Auro

CHART WORK—THE FIRST READING LESSON.

General object: To cultivate the mental faculties and give information.

Secondary object: To teach reading.

Specific object: To develop the idea of the word *boy* and teach pupils to recognize and spell it.

Preparation.—Before the hour of recitation, the teacher should print the word *boy* with other words many times on the blackboard.

When the pupils are to recite, they should be arranged in front of the blackboard and charts, so that the word to be learned can be seen by each.

The real boy.—Select from the class a boy, place him before the pupils, and ask them to state what is before them, or what they see, as: That is a boy; I see a boy. Then by easy yet careful questioning obtain answers something like the following: The boy has eyes; the boy has feet; the boy has ears. The teacher then asks what the boy can do with his eyes, feet, ears, &c., and obtains: The boy sees with his eyes; The boy hears with his ears, &c. (By this time the timid pupils have been relieved of embarrassment and inspired with confidence.)

The picture boy.—Show the class the picture of a boy and require pupils to point to and name the parts of the picture boy. Now ask what the boy before the class can do that the boy on the chart or in the picture cannot. Answers similar to the following will be given: This boy can see, that boy cannot; That boy can't run, this boy can; That boy can't work.

Ask why that boy cannot see, run, work, &c., and obtain: Because that is a picture boy.

Ask what kind of boy to call this, if that is a picture boy, and obtain: A true boy, a live boy, &c. Give the term *real* and have pupils point to the real boy and then to the picture boy, saying, as they do so, This is a real boy, or, This is a picture boy.

The word boy.—How many would like to see another kind of boy? Watch, while I write something that makes me think of a real boy. (Teacher prints the word and tells the pupil it is the word *boy.*) Pupils are practised in pointing to the real boy, the word boy, and the picture boy, and then to the word *boy* as found in various places upon the blackboard and charts until they know it at sight.

Spelling.—Pronounce the word *boy* and spell it, and call upon the pupils, individually and in concert, to imitate. Do this until each pupil can say boy, b-o-y boy.

Review and drill.—Cause pupils to find the real boy, the picture boy, and the word *boy.* Wherever the word boy is pointed to, let the pupil finding it pronounce and spell it. After him the class should pronounce and spell the word in concert.

This lesson can be given thoroughly in twenty minutes.

Charts and books.—Charts and picture cards are used in the beginning with these lessons. In the First Reader, which follows, each lesson is pictorially illustrated and preceded by a vocabulary containing all the new words of the lesson.

The phonic and phonetic methods have many advocates, and, if the teacher perfectly understands them and has the necessary charts, &c., they may be employed with advantage. I believe the word method is on the whole the best. While using that method the teacher may, if he choose, exercise the child's analytical faculties by a drill upon the phonic elements of words that have been learned.

Lessons for advanced pupils.—I should like much to introduce here some model reading lessons from Mr. Swett or Mr. Currie, suitable for advanced classes. Both these writers and all other trustworthy authorities whom I have consulted insist upon a method which makes the pupil seek to know the sense of what he reads and to feel the emotion, if there be any, in the composition.

These are the ideas that have determined the arrangement of all the best readers now in the market, and a teacher can hardly fail of success who carries out the plan of lessons embodied in these books.

Memorizing.—Committing to memory and speaking selections from the best authors is an invaluable exercise. It enlarges and cultivates the mind, increases sensibility, and aids in the formation of an animated style of reading. On this subject Matthew Arnold's opinion, expressed repeatedly in his reports as inspector to the education department, is of interest here. In his report of 1878 he says:

Learning by heart is often called, disparagingly, learning by rote and is treated as an old fashioned, unintelligent exercise and a waste of time. It is an exercise to which I attach great value, and it tends, I am glad to say, to become general in the schools of my district, partly, perhaps, because the teachers know that I am strongly in favor of it. Poetry is almost always taken for this exercise, not prose; and, when so little is done in the way of learning by heart, poetry should certainly have the preference.

* * * The advantage of this seems to me indisputable. If we consider it, the bulk of the secular instruction given in our elementary schools has nothing of that formative character which in education is demanded.

As regards sewing, calculating, writing, spelling, this is evident. They are necessary, they have utility, but they are not formative. To have the power of reading is not in itself formative. It is necessary to have it, and here is the defence of our promiscuous reading books and of allowing them all to be used freely; the power of reading has to be acquired by the pupil, and for acquiring the power of reading it must be owned that our reading books, with the promiscuous variety of their contents, serve well enough. But for a higher purpose, to serve in any way to form the pupil in addition to giving him the mere power of reading, no serious person would maintain that our reading books are at present fitted. But good poetry is formative; it has too the precious power of acting by itself and in a way managed by nature, not through the instrumentality of that somewhat terrible character the scientific educator. I believe that even the rhythm and diction of good poetry are capable of exercising some formative effect, even though the sense be imperfectly understood. But of course the good of poetry is not really got unless the sense of the words is known. And more and more I find it learnt and known; more and more it will be

easy to refuse to let the recitation count for anything unless the meaning of what is recited is thoroughly learnt and known. It will be observed that thus we are remedying what I have noticed as the signal mental defect of our school children: their almost incredible scantiness of vocabulary. We enlarge their vocabulary, and with their vocabulary their circle of ideas. At the same time we bring them under the formative influence of really good literature, really good poetry.

We have this advantage over the English, that our school reading books are made up largely of what Mr. Arnold would call "really good literature."

METHOD IN ARITHMETIC.

Arithmetic should be taught at first by the use of sensible objects, and throughout the entire course of instruction the order should be from the concrete to the abstract. Some children develop the power of abstract reasoning and evince pleasure in the same much earlier than others, but it is useless to attempt to force the development, and it is doubtful whether it should be much encouraged before the twelfth or thirteenth year.

Counters (pebbles or shells will answer the purpose), plane and solid geometrical forms, coins, weights, and measures must be made the basis of computation, and all ciphering taught as the visible representation of a mental process previously performed.

Arithmetic plays such an important part in all our schools and has such a power for the misery or delight of children that it seems of the utmost consequence that every teacher should understand exactly what is meant by a natural development of numbers.

Model lessons from report of Massachusetts board of education.—The following model lessons and general suggestions are taken from the Forty-second Report of the Massachusetts Board of Education, previously referred to. They are not better than other lessons and discussions which are before me, but they are in a form more easily adapted to the present pages:

The following are presented as examples of a natural development of number. It should be borne in mind that all development should be by the use of objects preceding word statement or even questions: the thing and operation, afterwards the name and narration. Vertical lines are here used as representatives of any objects that may be employed in the school room. The mark + indicates merely the movement of the object or objects on the right *to* the objects on the left of it, and the mark · the movement of the object or objects on the right of it *away from* the objects on the left of it. Of course the language for operations in number should not be stereotyped, and the operations themselves should be presented promiscuously as well as in regular order of development.

THE NUMBER THREE.

THE NUMBER, | | |.

COMBINING AND SEPARATING.

(*a*) Using |.

Objects.	*Language.*
| + | + |	Three ones are three.
| | |	Once three is three.
| | |	There is one three in three.
| · | · |	There are three ones in three.

(*b*) Using | and | |.

Objects. — *Language.*

| | + | — Two and one are three.
| + | | — One and two are three.
| | · | — Three less one is two.
| · | | — Three less two is one.
| · | | — There is one two in three and one over.

COMPARISON.

| | | is | more than | |.
| | | is | | more than |.
| | is | less than | | |.
| is | | less than | | |.

EXAMPLES FOR RAPID SOLUTION.

How many ones in | | | less | less | and . | | more?

| and | and |, take away | |, add | and |, take | | away, add | and | —how many now?

PROBLEMS.

How many cents must you have to buy a three-cent apple?

Pussy had three kittens. One ran away. How many staid at home?

If one little girl can ride in one cart, how many little girls can ride in three carts just like it?

Fred and Grace found three violets under the pine tree. How could they share them?

THE NUMBER FOUR.

THE NUMBER, | | | |.

COMBINING AND SEPARATING.

(*a*) Using |.

Objects. — *Language.*

| + | + | + | — Four ones are four.
| | | | — Once four is four.
| | | | — There is one four in four.
| · | · | · | — There are four ones in four.

(*b*) Using | and | | |.

| | | + | — Three and one are four.
| + | | | — One and three are four.
| | | · | — Four less one is three.
| · | | | — Four less three is one.
| · | | | — There is one three in four and one over.

(*c*) Using | |.

| | + | | — Two and two are four.
| | + | | — Two twos are four.
| | · | | — Four less two is two.
| | · | | — There are two twos in four.

COMPARISON.

```
| | | | is |       more than | | |.
| | | | is | |     more than   | |.
| | | | is | | |   more than     |.
| | |   is       | less than | | | |.
| |     is     | | less than | | | |.
|       is   | | | less than | | | |.
```

EXAMPLES FOR RAPID SOLUTION.

Once two twos, less three, two more, all taken once and one added, two taken away; what is twice the number left?

Four less one, less another one, two ones added, three taken away; how many less than four have you left?

PROBLEMS.

John, James, Kate, and Lucy are standing in their class. How many children are standing in the class?

Boys, you may take your seats. How many children are standing in the class now?

The same class may all stand. John, stamp with your right foot once for every scholar in the class except yourself. How many times must he stamp, Kate?

Lucy, if James gave you four rings and you put just as many of them on one little finger as on the other, how many rings would you have on each little finger?

THE NUMBER FIVE.

THE NUMBER, | | | | |.

COMBINING AND SEPARATING.

(a) Using |.

<table>
<tr><td>Objects.</td><td>Language.</td></tr>
<tr><td>|+|+|+|+|
| | | | |
| | | | |
|·|·|·|·|</td><td>Five ones are five.
Once five is five.
There is one five in five.
There are five ones in five.</td></tr>
</table>

(b) Using | and | | | |.

<table>
<tr><td>| | | |+|
+			
			·
·			
·|		|</td><td>Four and one are five. One and four are five. Five less one is four. Five less four is one. There is one four in five and one over.</td></tr>
</table>

(c) Using | and | |.

<table>
<tr><td>| |+| |+|
| |+| |+|
|·| |·| |
|·| |·| |</td><td>Two and two and one are five.
Two twos and one are five.
Five less two less two is one.
There are two twos in five and one over.</td></tr>
</table>

(d) Using | | | and | |.

<table>
<tr><td>| | |+| |
	+		
		·	
	·		
	·			</td><td>Three and two are five. Two and three are five. Five less two is three. Five less three is two. There is one three in five and two over.</td></tr>
</table>

COMPARISON.

| | | | | is | more than | | | | .
| | | | | is | | more than | | | .
| | | | | is | | | more than | | .
| | | | | is | | | | more than | .
| | | | is | less than | | | | | .
| | | is | | less than | | | | | .
| | is | | | less than | | | | | .
| is | | | | less than | | | | | .

EXAMPLES FOR RAPID SOLUTION.

| | | | | less | | less | | |, | | more, | less; how many will twice as many be?

| | × | | + | − | | | × | × | | − | | | + | | | | ?

PROBLEMS.

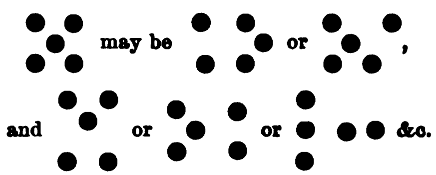
Are your arms and my arms five arms?

How many arms less than five arms are your arms?

I have five horses. How many spans can I make from them? (Explain "span," if the children do not understand you.)

Extensions of these exercises will readily suggest themselves. Care should be taken to arrange in various relative positions the objects used.

| | | | | separated may appear as, | | | | . | or | | | | |, and



Each number should become familiar in all the different forms it may assume under analysis.

In counting, count thus:

| | | | | | | | | | | | | | | .
one two three four five.

| | | | | | | | | | | | | | | .
five four three two one.

Do not count thus:

| | | | |
one two three four five.

In the earliest stages of composing a number, | + | + | ? e. g., may be read as "One and one and one, how many?"

First year—first half.

Essentials.	Incidentals.	Suggestions.
Develop the numbers 1, 2, 3, 4.	Add, multiply, subtract, and divide, **but make no combination greater than 4.** Treat addition and multiplication as kindred forms of combination; subtraction and division, of separation. "Times" and "is contained in," as well as "add," "subtract," "multiply," "divide," are terms to be used only after the ideas of number have been well developed. **Teach number, not figures.** **Teach only with objects.** Count only by object. Let both teacher and pupil perform **with objects** all the operations upon each number, and state clearly what each sees the other do. **The language for the number must be perfect, else the idea of the number will be defective.** The number and all combinations and separations used are **to be known at sight.** Allow no counting up to combine, e. g., | | and | |. Train **sight, hearing, and touch** to be quick and accurate.	**Teach but one number at a time. Make no combination greater than the number being taught.** Let the pupil master all the combinations within that limit and all the separations that can be made with that number and lower numbers before passing to the next higher. **Proceed very slowly.** Give much time to those pupils who do not learn number readily. **Allow no hesitation.** Require pupils to tell instantly what they see when shown objects, and let them take objects and make combinations and separations, and tell, at the same time, what they are doing or what their comrades do. **Pass no error.** Fix the truth at once by repeating the work with objects. **Use as aids** numeral frames, dots, lines, geometrical forms, blocks, splints, pebbles, beans, corn, nuts, fingers, things and parts of things in the school room, parts of animals, of vehicles—things that go, or grow, or otherwise interest the child mind—actions, such as walking, clapping, stamping, &c. Except in review problems the objects should always be actually present to the senses.

First year — second half.

Essentials.	Incidentals.	Suggestions.
Develop the numbers 1 to 10, as before. **Then write in words and in figures with the signs.**	**Continue previous work.** Count, with objects, by ones, twos, &c., and then lead the pupil to say, as expression of his idea, two twos are four, three twos are six. These facts must all be first made familiar by use of objects. The writing on slate and blackboard of the nine digits and the cipher is to be taught very carefully, one figure at a time, and in this order: **1, 4, 7, 0, 6, 9, 5, 2, 3, 8.** Have all work in good figures and neatly arranged. The numbers 1 to 10 are to be developed with objects only, without the least use of written signs or abstract numbers. If number to 10 has not been thus learned thoroughly before the end of this year, postpone the use of figures to the next year. If slate exercises are used, let them be in marks, not figures, until number to 10 is well developed. When pupils pass to use of figures, continue to use objects, and associate with the figures the ideas of number as already developed.	Use no combination greater than 10. First fix in the pupil's mind, by the **actual use of objects,** distinct, easily recalled ideas of number. Then practise forming combinations and separations rapidly. Then give for solution simple problems in concrete (applied) number. Roman numerals may be taught in regular order to X, after the Arabic figures are learned. Do not use statements, or even questions, when showing objects would better call them out from the pupil. Do not prompt the pupil by questions that contain half the answer. Aim here and always in arithmetic at two results: the development of the **reasoning powers** and the habit of **rapid** and **accurate calculation.**

Second year—first half.

Essentials.	Incidentals.	Suggestions.
Develop the numbers 1 to 20, as before. **Write these numbers in words and in Arabic and Roman characters.**	**Make frequent reviews of previous work.** Use Grube's tables of 10 for part of the review work. Develop each number **orally first, with objects**; then repeat with written work. Let combinations and separations be read at sight; 6, for example, being **instantly recognized** in its forms, | | | | + | |, two threes, 5+1, 2×3, 12÷2, 8−2. Addition, multiplication, subtraction, and division tables are to be thoroughly learned as far as each number developed, after developing the number. **They are only for review work.** They are to be learned both promiscuously and in regular order, and will thus be mastered, gradually but completely, up to the combination 12×12, at least. Practise rapid addition of all numbers that make the number being developed or less. Give a large number of interesting and natural examples in applied number. Have the problems solved with objects.	Let the teacher perform the four operations **with objects** and the pupils represent them in figures on slate and blackboard; then the teacher write figures and the pupils **show** the corresponding numbers and operations. Have class exercises and exercises between members of the class. Few pupils can recognize at sight a group of more than ten objects, but combinations making number to twenty can be recognized. Add rapidly numbers expressed in columns of figures, thus: 2, 3, 4, 1, 5 — six, ten, thirteen, fifteen; or, five, nine, ten, fifteen. Begin with **short columns** and **small figures**, and **advance slowly**, but **require promptness.** Only concrete examples that come **within easy range** of the child's imagination should be used. **Do not hasten to complete the assignment.** Make each step sure before you venture another.

Second year — second half.

Essentials.	Incidentals.	Suggestions.
Operate in addition, subtraction, multiplication, and division up to 50.	Review, and do **not advance** until pupils **are ready** to do so. Use Grube's tables of 10 and of 20 for part of the review work. Above 20, objects can be used to advantage only to group parts of numbers; 35, e. g., may be grouped in three rows of 10 dots each and one of 5 dots.	Pupils should be encouraged to make up examples and give them to the class. Pupils should be trained to solve problems habitually by a direct perception of their conditions, and not after a pattern or rule. Reading of combinations and separations at sight and solution of many small figured examples in concrete numbers should be continued **throughout the course.**
Represent, as before, all numbers to 50.	Require solution of problems involving only **small figures** but **some reasoning**, and obtain correct statement of processes in complete sentences uttered intelligibly. Avoid set forms of phrasing; cultivate independent and varied expression. Teach writing of numbers with care. Continue to learn, as review, tables of the four operations to 50 in each.	Up to this time, at least, the four operations should be treated as practically but two: multiplication as a form of addition and division as a form of subtraction. Teach the use of the cipher; as $1-1=0$, $0+0$, $0-0$, 0×1, 0×5, 5×0, $0\div5$.
Use of money, weights, and measures.	Use objects entirely in teaching money, judging distance, estimating weight. Show metre, litre, and gram.	Very little time is needed in teaching Roman numerals. Pupils should make them on slate and blackboard; have exercises in recognizing them at sight on blackboard, and drills in finding chapters.

Third year—first half.

Essentials.	Incidentals.	Suggestions.
The four operations to 100. **Numeration and notation to 100.** **Halves, fourths, sixths, eighths, tenths.**	**Test results of all previous work.** Continue object work in money, weights, and measures, metric as well as English. Do with these what you can do well. Continue to learn the usual tables in review of number developed and used. Review with Grube's tables of 20. Represent numbers as began to do in first half of second year. Teach rapid calculation. Limit multipliers and divisors to one figure. Teach numeration and notation with objects. Be sure that the value expressed by figures, according to place, is understood. Teach tenths as well as tens, but objectively first. Use only objects in teaching fractions; no figures yet.	Invent manifold ways of testing results thoroughly. Lead pupils to discover every fact for themselves by skilful manipulation of objects and by dexterous questioning. For developing number above 50 this order is suggested: Combine— Three numbers, then four, five, &c., of one place each, as 1 + 2 + 1, 4 + 3 + 1. Two numbers, not both of two places at first, as 15 + 4, 17 + 6; then, 12 + 13, 23 + 16. Afterwards, three, four, five numbers, or more. Numbers of three places, on same plan Separate— Number of two places, the part removed to be of one place only, and, at first, less than the unit figure of the minuend: as, 14 − 4, 68 − 6; then 16 − 8, 56 − 9. Number of two places in both minuend and subtrahend, both figures of latter less than those in same places in minuend; then unit figure in subtrahend greater. Same with number of three places. Use combinations and separations in the same example as soon as can safely.

Third year — second half.

Essentials.	Incidentals.	Suggestions.
The four operations to 1,000. **Thirds, fifths, sevenths, ninths, tenths.** **Change fractions already learned without altering their value.**	Continue previous work, giving a large number of examples involving **all that has been already taught.** Continue use of money, weights, and measures. Accustom pupils to sight and use of metric as well as English units of length and weight. Limit multipliers to two figures and divisors to one figure. **Oral** work must continue to occupy at least as much attention as written work. Change halves to fourths, sixths, eighths, tenths; thirds to sixths, ninths; fourths to eighths; fifths to tenths; also the reverse. **Objective teaching** should take at least one-half of the time given to arithmetic **throughout the course.** The order of procedure should be: objects seen, facts stated, principles discovered and applied, rather than rule memorized, pattern imitated.	Increase the size of multipliers very slowly. Impress the value of the tens figure by object work, by using the same figure as in the unit place, by inserting the unit figure (0) in the product by the tens, by using the addition form of multiplication, and in other ways. If pupils are led to discover for themselves every fact, process, definition, and principle and to state what they discover, each lesson in arithmetic will be also a lesson in language; and that which the pupil has expressed for himself has become a part of his mental resources. Take time for this from the beginning, in order to save time afterwards and to develop in the pupil that mental power which he can gain only by making facts his own by experience. Secure rapidity and accuracy of calculation, and, with the aid of objective representation, train the pupils to **bring their minds to bear energetically upon the working out of problems** adapted to their capacity. Pupils should explain, show, illustrate to the teacher, rather than the teacher explain to them, and so prevent them from discovering what they ought to discover for themselves. **What we do for a pupil is measured by what he can do for himself.** What one can do one knows.

I would suggest here that the teaching of arithmetic is carried to excess in our schools. Although recent text books have greatly simplified the subject, still further reduction is desirable. Practical geometry, or as the English term it inventive and the French intuitive geometry, ought to be introduced at a very early period. The idea is carried out with great success in the French and Belgian systems of primary instruction.

METHOD IN GEOGRAPHY.

Geography, which is a branch of the required course in every State and for which a place is made in all the programs, may be introduced with advantage in very young classes. If properly treated it is a means not only of instruction but of true education to the child.

In this position we are confirmed by many distinguished authorities, men of genius even, who have developed a scientific plan of geographical study and simplified it to the capacity of the youngest minds.

In geography [says Agassiz] let us not resort to books, but let us take a class and go out into the field and point out the hills, valleys, and rivers, and show them what are accumulations of water and expanses of land; and then, having shown them that, let us bring representations of what they are to learn, that they may compare them with what they know, and the maps will have a meaning to them. Then we can go on with the books and they will understand what these things mean and will know what is north and east and south, and will not merely read the letters N., E., S., W. on a square piece of paper, thinking that England and the United States are about as large as the paper they learn from. When I was in the College of Neufchâtel I desired to introduce such a method of teaching geography. I was told it could not be done, and my request to be allowed to instruct the youngest children in the institution was refused. I resorted to another means, and took my own children, my oldest, a boy of six years, and my girls, four and one-half and two and one-half years old, and invited the children of my neighbors. Some came upon the arms of their mothers; others could already walk without assistance. These children, the oldest only six years old, I took upon a hill above the city of Neufchâtel, and there showed them the magnificent peaks of the Alps, and told them the names of these mountains and of the beautiful lakes opposite. I then showed them the same things on a raised map, and they immediately recognized the localities, and were soon able to do it on an ordinary map. From that day geography was no longer a dry study, but a desirable part of their education.

Guyot's method.— Guyot's method in the earliest stage of instruction was, also, to direct the attention of pupils to the features of the landscape around them and acquaint them with the use of terms by which these could be accurately described.

The Institute of the Brothers of the Christian Schools, in whose schools great success has been achieved by the scientific teaching of geography, begins the subject in the same way substantially. After the observation and description of surrounding scenes come lessons in the representation of features of the earth's surface, which are not characteristic of the particular locality, but with which children must early be made familiar. Thus, if no islands are in sight, the illustration may be made by a basin of water and a little clay or turf; indeed, with clay

and water and very slight skill in modelling, all the contour and relief forms of the earth's surface can be made perfectly clear to children, and the terms applicable to these imparted without difficulty. When the proper time arrives care must be taken to have the pupils form a correct idea of the mode of representation by maps. One of the best exercises for this purpose, and one most commonly advised, is the representation of the school room itself, first in rough outline and finally reduced to an exact scale. In successive exercises, maps of the district or a portion of it may be drawn. Thus the idea of a map becomes perfectly intelligible to the mind. As a rule, it will not be necessary to form more than three classes in geography. In this connection I am tempted to mention that admirable little book by Miss Crocker, Methods of Teaching Geography. For modes of procedure with the older classes teachers will find excellent suggestions in the best text books in the market, and also in the various works on methods of teaching in the list of books appended to this circular.

ORAL OR OBSERVATION LESSONS.

The courses of study prepared for rural schools and the scheme of study republished from the report of the Massachusetts board of education make provision for what are termed oral lessons, object lessons, or miscellaneous. The scope, proper conduct, and utility of such lessons are matters concerning which various and opposite opinions are entertained.

Last year, at the instance of the committee on examinations, Hon. E. P. Seaver, superintendent of public schools, Boston, Mass., addressed a series of inquiries to the principals of the grammar schools of that city, for the purpose of ascertaining their views on the existing course of study. The subject of oral instruction was considered in the answers, and the views presented are thus summed up by the committee in their report:

The chief points of agreement are in recommending that less time be devoted to English history and oral instruction and asking more definiteness of details and limits for the course of study.

Oral instruction.—This name, although traditional, is misleading, and that of observation lessons has been suggested as a substitute in the primary course. Much has been included under the present heading which properly belongs elsewhere, and many teachers seem to have understood that, during the time specially devoted to oral instruction, they were to talk to their pupils, who should sit passive, even if interested; whereas the intention should be to arouse and direct the mental activity of the pupils, to lead them to observe accurately, to think about what they observe, and to express clearly the results of their observation.

As so many of the masters have reported the time given to this branch not usefully spent, the question naturally arises why they have not, in their own schools, where they hold the power and responsibility, laid out a definite course for their teachers to follow in this as in other studies, admitting of much elasticity of construction, and so secured the profitable employment of the time devoted to it. But even with the rather vague understanding of the purpose of oral instruction which has prevailed among most of the teachers hitherto, it may be questioned whether the greater fluency

and power of expression noticeable in the children are not owing in part to the increased opportunity of hearing language used, so that much may have been gained from this form of lesson, if not all that is desirable.

Many of the masters express the opinion that, owing to excess of oral teaching, the children have lost in power or inclination to depend upon themselves and to use books for the acquisition of knowledge without the intervention of their teacher. This is a point not easily proved, but, if their views are correct, it is to be hoped that a better comprehension of the ends attained may lead to such changes in the character of teaching as will remedy this defect.

Without doubt oral or, as the report suggests, observation lessons upon form, color, proportion, &c., may be made exceedingly interesting and profitable to elementary classes if the teacher understands the art of conducting such exercises; when poorly managed they interfere with the habits of attention and orderly thought which the schools should foster.

Herr Busse, principal of the girls' high school, Berlin, presents the following as the chief laws of the object method:[1]

The chief laws of the method are—

(1) Instruct by means of actual inspection. * * * Nothing is more aimless than object teaching without actual observation (inspection). The instruction can only bear justly and correctly the name of object teaching and possess the intuitive property when it is based upon the actual observation (inspection) of things or relations. What many words and long definitions will not effect may be effected by immediate observation or inspection. Object teaching, therefore, needs the best use and application of the material of observation. The Kindergarten wisely uses little sticks of various lengths, cubes of various kinds of wood, building blocks. The teachers of the lower classes in the elementary schools ought to employ various objects, models made of wood or paper, natural plants, or colored pictures of animals, plants, and human productions. Such material for observation has the most favorable effect upon the development of the children.

(2) Proceed from the easy to the difficult: (*a*) from the known to the unknown; from the near to the distant; * * * (*b*) from the simple to the complex; from single objects to two and more, that the acts of comparison and discrimination may come into play. Then let more objects come into the group. Finally, groups form a collective image; (*c*) from the concrete to the abstract. Dwell upon the sensible characteristics of objects before you attempt generalizations. Consider first the real, then the possible and necessary; first the individual thing, then the general thing.

* * * * * * *

(3) Give in each hour, if possible, a little whole in contents and form. Work out every lesson in writing; for only so can you satisfy this kind of instruction, in which contents and form are equally important and must develop themselves symmetrically. * * *

(4) Use poetry in the service of this instruction. An infinite number of the most beautiful poems offer themselves, as if spontaneously, as flowers of contemplation. You will in years have the richest variety; and do not forget, when you lay this instruction before yourself and build it up as a whole, that it is poetry which seizes and ennobles the man, the whole man.

(5) As to the external form of the method, no kind of instruction offers so great an opportunity for suggestive and fruitful conversation as this. As in all catechising, so here, the object is to render from section to section a small group of synoptically arranged observations into propositions as naturally related to each other as possible.

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[1] From Diesterweg's Wegweiser zur Bildung für deutsche Lehrer, 1874.

ELEMENTARY SCIENCE.

When pupils are sufficiently advanced to take up the elements of any particular science, as botany, physics, chemistry, &c., the teacher can draw both the matter and method of the lessons from some one of the elementary text books prepared by specialists in the branches. I do not here refer to text books that are intended to be memorized, but to such books as Miss Eliza Youmans's First Book in Botany, Gray's How Plants Grow, and Morse's Zoölogy, which will put teachers into possession of a natural method of proceeding, both in acquiring for themselves and in imparting to others the knowledge of nature.

This is not the place to discuss the importance of science teaching in the common schools nor the changes that must be made in the school system before this department of knowledge will have adequate recognition. As the case now stands the teachers must do the best they can with the opportunities and facilities at their command. For the encouragement of such efforts as are possible under the circumstances, it is well to note the results of experiments made under equally unfavorable conditions and to recall the thoughts of some of the best minds on this subject.

Dean Dawes's village school.—In his special report to the English education department on Dean Dawes's village school, Mr. Moseley observes:

> That feature in the King's Somborne school which constitutes probably its greatest excellence, and to which Mr. Dawes attributes chiefly its influence with the agricultural population around him, is the union of instruction in a few simple principles of natural science, applicable to things familiar to the children's daily observation, with everything else usually taught in a national school. * * * Here, where so many other things are taught besides reading, the children are found in advance in reading of other schools in the majority of which scarcely anything else is taught.

In his Suggestive Hints on Secular Instruction in Schools, Dean Dawes himself dwells most forcibly on the value of elementary science as a means of education:

> In no way [he says] can the teachers in our higher class of elementary schools give such a character of usefulness to their instruction as by qualifying themselves to teach in these subjects, introducing simple and easy experiments which illustrate the things happening before their eyes every day and convey convictions with them the moment they are seen and explained. It is a great mistake to suppose that boys of twelve and thirteen years of age cannot understand elementary knowledge of this kind when brought before them by experiment.

Mr. Henslow's village school.—In his essay on elementary education Sir John Lubbock gives the following particulars with reference to another village school that attracted great attention in England:

> As regards Mr. Henslow's school and the botanical instruction so successfully carried on there, Dr. Hooker gave some very interesting evidence before the public school commission. Lord Clarendon asked him as to Mr. Henslow's method of instruction.
>
> "Invariably," said Dr. Hooker, "he made it practical. He made it an objective study. The children were taught to know the plants and to pull them to pieces and

to give their proper names to those parts, to indicate the relation of those parts to one another, and to find out the relation of one plant to another by the knowledge thus obtained."

Lord Clarendon continued: "Those were children, you say, generally from eight to twelve?"—"Yes; and up to fourteen." "And they learned it readily?"—"Readily and voluntarily, entirely." "And were interested in it?"—"Extremely interested in it. They were exceedingly fond of it."

"Do you happen to know whether Professor Henslow thought that the study of botany developed the faculties of the mind, and that it taught these boys to think; and do you know whether he perceived any improvement in their mental faculties from that?"—"Yes; he used to think it was the most important agent that could be employed for cultivating their faculties of observation and for strengthening their reasoning powers." "He really thought that he had arrived at a practical result?"—"Undoubtedly; and so did every one who visited the school or the parish."

"These were children of quite the lower class?"—"The laboring agricultural class." "So that the intellectual success of this objective study was beyond question?"—"Beyond question."

Dr. Hooker went on to say that a child might very well begin natural history at eight or nine years old.

Dr. Carpenter was asked: "Do you think that the mind, ordinarily speaking, is as apt for the exercise of its faculties upon the subject of natural science as upon grammar and mathematical subjects at the early periods of life?"—"I should say more so; that it is more easy to fix a child's attention upon something which it sees than upon an abstraction."

The methods and uses of the study of science were thus eloquently set forth by Professor Agassiz in an oft-quoted lecture:

Natural history, I have already said, should be taught from objects and not from books, and you see at once that this requires teachers who know these objects, and not merely teachers who can read and see whether the lesson set has been committed faithfully to memory. The teacher must know these objects before he can teach them. And he ought to bring them into the school and to exhibit them to the scholars, and not only that, but to place them in the hands of each scholar. * * * After having examined one object minutely—one of those objects which can be seen everywhere—take another, one which has some similitude to it. Analyze its parts, one after the other, point out the difference which exists between this and that examined before, and you are at once on the track, so important in all education, which exists in comparisons. It is by comparisons that we ascertain the difference which exists between things, and it is by comparisons, also, that we ascertain the general features of things, and it is by comparisons that we reach general propositions. In fact comparisons are at the bottom of all philosophy. Without comparisons we never could go beyond the knowledge of isolated, disconnected facts. Now, do you not see what importance there must be in such training: how it will awaken the faculties, how it will develop them, how it will be suggestive of further inquiries and further comparisons; and as soon as one has begun that sort of study there is no longer any dulness in it. Once imbued with the delight of studying the objects of nature the student only feels that his time is too limited in proportion to his desire for more knowledge. And I say that we can in this way become better acquainted with ourselves. * * *

The difficult art of thinking can be acquired by this method in a more rapid way than any other. When we study logic or mental philosophy in text books, which we commit to memory, it is not the mind which we cultivate, it is the memory alone. The mind may come in, but if it does in that method it is only in an accessory way. But if we learn to think, by unfolding thoughts ourselves from the examination of objects brought before us, then we acquire them for ourselves, and we acquire the ability of applying our thoughts in life. It is only by the ability of observing for our-

selves that we can free ourselves from the burden of authority. As long as we have not learned how to settle a question for ourselves we go for authority or we take the opinion of our neighbor; that is, we remain tools in his hands, if he chooses to use us in that way, or we declare our inability of having an opinion of our own. How shall we form opinions of our own otherwise than by examining the facts in the case; and how can we learn these facts which are unchangeable, those facts over which man, with all his pride, can have no control?

With reference to the study of physical science Cuvier observes:

Every transaction which supposes a classification of facts, every research which requires a distribution of matter, is performed after the same manner, and he who has cultivated this science merely for amusement is surprised at the facilities it affords for disentangling all kinds of affairs.

In the light of such opinions it seems that the neglect of the study of force and matter in elementary schools entails a great loss upon individuals and upon society, since it is well known that in general the mind only follows the bent it acquires in childhood.

MORAL TRAINING IN COMMON SCHOOLS.

The Virginia course of study makes mention of another class of subjects frequently included under the general head of oral instruction, viz, morals, manners, and hygiene.

It has always been customary to view the public school as having a distinctly moral purpose. "Without exerting or ripening into ethical potency," says Dr. Stanley Hall, "knowledge is not power, but weakness, and is nearly as likely to arm the bad as the good elements of the soul and of society." This idea meets us constantly in the expression of statesmen and philosophers with reference to the schools and in the laws and regulations by which their work is defined, but at the same time the question is also constantly arising whether the purpose of the schools in the moral development of the people is to be accomplished by a set effort in that direction or is to be expected as one of the results of intellectual training. Whenever the latter view prevails, there is a disposition to limit the schools exclusively to the work of a narrow, intellectual drill and to imparting such elements of knowledge as are required for ordinary business purposes.

Against this tendency there is at present a strong protest in all countries, so that we find ourselves in accord with the best thought of the day in affirming that moral training must be treated as a distinct part of the work of the public schools. Until recently it has been left to the chance effects of the necessary discipline, combined with those vague and too often wearisome talks about conduct, that serious minded adults generally feel it their duty to inflict upon the young. This sort of effort is as far as possible from any pedagogic ideal of training. What such an ideal requires as a method of moral training is illustrated by the practice of teachers who have achieved success in this particular.

Perhaps the most striking instance of the kind is the work of Dr. Arnold, at Rugby. Readers of The Life and Letters of Dr. Arnold, by Dean Stanley, cannot fail to perceive that in his administration of the

school the great master exemplified all the virtues that he formally inculcated. The conditions of Rugby were widely different from those of country day schools; nevertheless, in the latter also it will be found that the union of example and precept is essential to effective moral training. We cannot recall the name of Arnold without remembering that he brought to his work rare talents. He had a perfectly clear notion of what constitutes the moral quality of actions and the advantage of a settled belief in the system of Christian ethics, while his study of philosophy and history, as well as his observations of men, enabled him to understand the motives which control human actions, the standards by which those actions are to be judged, and the sort of action that is right in the several relations of life.

It is useless to expect such high qualifications in ordinary teachers. Their opportunities for acquiring knowledge, their observations of life, are limited; they must take their notions of ethics and of the means by which the consciences and the conduct of pupils may be improved largely at second hand; hence arises the need of definite and detailed directions to guide teachers in this important part of their work.

The teacher who examines himself with reference to the subject is likely to discover that his notions of what is right or wrong or possible for a child are formed in part from his conviction of what is right or wrong for himself and in part from the effect that the child's acts have upon himself in respect to irritating or interfering with him. He will probably be forced to admit that he confounds the inexpedient with the wrong in his discipline, and if he asks himself in all sincerity "How shall I develop the moral susceptibilities of the child, how improve his conduct?" he will be unable to answer, from simple ignorance of those mental states and processes that determine conduct and character, viz, feeling and will.

So many teachers have made such acknowledgments to me that I am satisfied earnest self examination generally results in a teacher realizing the need of particular preparation for this part of his work and puts him upon the search for the means of such preparation. The standard works upon moral philosophy are profitable reading in this connection.

Here again, also, I would call attention to Sully's Psychology. It is a large book and a profound book, but I know of no work that discusses matters more clearly and intelligibly to the ordinary reader, and none in which the endeavor has been so successfully made to show the bearing of what is known about the phases of the mind upon the practical work of education.

The section on the cultivation of emotion, following the discussion of simple feeling, Chap. XI; on the training of the moral faculty, following the discussion of the complex feelings, Chap. XII; on the training of the will and the active organs, following the discussion of the will, Chapter XIII; and on the conditions of discipline, following the discus-

sion of complex action, Chap. XIV, are exactly what most teachers need as a means of indicating how the knowledge of mental phenomena is to be applied in the moral culture of children.

The closing paragraphs of the last named section are so discriminating in reference to the scope and limitations of the teacher's power in the matter of moral training that I cannot resist the inclination to quote them entire:

DISCIPLINE OF THE HOME AND OF THE SCHOOL.

The home is the garden of moral character. If the will and moral character are not nourished and strengthened here, they will fare but ill when transplanted into the more artificial surroundings of school life. In the home the whole life is in a manner brought under the supervision of the educator. Not only so, the strong and close affection which grows up between the parent and child gives a unique character to the home discipline. On the one side, the mother is solicitous about her charge as the teacher cannot be, and is far better able as well as much more strongly disposed to study his moral peculiarities. On the other side, the child's feeling of dependence and his love are strong forces tending from the first in the direction of obedience. Here then the foundations of character have to be laid if they are to be laid at all. The relations of home, moreover, serve to bring out and exercise all the moral habits; not only the rougher virtues of obedience, veracity, the sense of right and justice, &c., but the more delicate virtues of sympathy, kindliness, and self sacrifice.

Contrasted with this the discipline of the school has but a very restricted moral effect. The immediate object of school discipline is indeed not moral training at all, but rather the carrying on of the special business of the school, namely, teaching. Incidentally the management of a school necessarily does subserve moral education, calling forth habits of obedience, orderliness, industry, deference, &c. And the teacher is expected to make the best of his opportunities for training the will and forming the character of his pupils. The limitations here are obvious. The first is the restricted range of life brought under the master's control. School occupations are a kind of artificial addition to the child's natural life, and offer but little play for his characteristic tastes and inclinations. Again, since the teacher has to do with numbers there must necessarily be wanting the aid of those moral forces of close individual sympathy and strong personal attachment which play so important a part in home discipline.

These defects are, however, made good to some extent by the presence of a new agency in the school, namely, that of public opinion. We have already touched on the effect of this in shaping and giving strength to the growing moral sentiment of the individual. To this must now be added that the existence of public opinion, of a mass of corporate feeling on the side of order and right conduct, is a powerful force working in the direction of good conduct. Such a body of sentiment may, indeed, be said to be, in these days at least, a necessary support of the master's authority. It is to the schoolmaster what public opinion is to the ruler of a state. School experience familiarizes the mind of the boy with the fact that he is a member of a society; that the command to be brave or truthful is enjoined by the voice not of an individual but of a community. In this way he learns to regulate his actions by a reference to a social law and a common rule of conduct.

The effect of the ideal school régime, the master removed at a certain distance, inspiring a feeling of awe, the little society of the school sustaining his authority and following out the principles and spirit of his discipline even in the playground and in his absence, is to cultivate a certain type of moral character which is in a manner supplementary to that specially cultivated by home surroundings. The mind acquires a manly tone of self reliance, and the severer virtues, obedience and respect for law, courage, ambition, sense of honor and of justice, are nourished. Where this

régime is happily favored by the presence of a fine and admirable personal character in the governor and of a healthy and lofty public spirit among the governed, it is capable, as we know, of doing much to mould the permanent character.

INSTRUCTION BY CONVERSATION.

The teacher who cultivates the art of conversing with children will find this a great power in their moral training. Occasional and apparently impromptu talks, growing out of occurrences in the school room or on the playground, pointed by allusions to history or apt passages from literature, are often wonderfully impressive. I recall at this moment an incident on the point in the life of Sir Charles Reed. "His first movement towards religious decision, he was wont," says his son and biographer, "to trace back again to one Sunday evening when his mother had been speaking about his future course and asking what he meant to be. She read to him the account given by Bunyan of the Interpreter's house. 'So he led him into a private room, and bid his man open a door; the which, when he had done, Christian saw the picture of a very grave person hanging up against the wall, and this was the fashion of it: it had eyes lifted up to Heaven, the best of books in his hand, the law of truth was written upon his lips, the world was behind his back. It stood as if it pleaded with men, and a crown of gold did hang over his head.' This picture was henceforth stamped upon the boy's mind. Forty years after, in addressing a congregation of children, he said that it was that evening spent with his mother that witnessed his earliest resolve to be like the man whose picture hung upon the Interpreter's wall." In this connection should be mentioned a little book published in 1856, entitled Elementary Moral Lessons for Schools and Families, by M. F. Cowdery, superintendent of public schools, Sandusky, Ohio. The idea of the book is excellent, but it consists too largely of incidents in the lives of unknown persons narrated by unknown authors. Similar incidents drawn from history or the writings of authors who employ a vigorous, lively style would be more effective.

MANNERS.

It is safe to assume that where the entire organization of the school is adapted to produce a bracing moral atmosphere around the pupils rude manners will not be fostered. The extent to which politeness shall be made a matter of formal instruction depends upon circumstances. I have known teachers who went so far as to teach their pupils the niceties of conventional etiquette, and with excellent effect. In such a shifting state of society as our own it is impossible to foresee what may result from so simple an experiment. Of Andrew Crawford, a teacher whose instruction Abraham Lincoln once enjoyed, it is recorded that "in addition to the ordinary branches of education he also taught manners. One scholar would be introduced by another, while walking round the log school room, to all the boys and girls, taught to bow properly, and otherwise acquire the ordinary courtesies of life." This advantage was evidently not thrown away on the future President.

SCHOOL DISCIPLINE.

In a school in which instruction is made interesting and moral training effective, direct discipline is reduced to a minimum; nevertheless even here there will be cases of disobedience to be dealt with and refractory pupils to be subdued. An excellent manual of directions for the maintenance of discipline is the circular published by the Bureau of Education, entitled "Methods of School Discipline."

CIVIC INSTRUCTION.

The duties and rights of citizens, or civic instruction as it is called, should properly be included as a branch of common school instruction. The subject has been made obligatory in French schools and a series of text books upon the same has recently been prepared by authors of no less repute than Paul Bert, Mme. Henry Gréville, and Henri Marion.

Those by Paul Bert and Mme. Gréville are mere primers, in which the round of social and civic duties is unfolded in a series of lively, ingenious dialogues between teacher and pupils.

Henri Marion's book consists of short essays on all the topics embraced under the head of "moral and civic education." It is, as he says, a "serious book," not intended for young children, whom it is necessary to amuse as well as to instruct, but for youths thirteen or fourteen years of age, the period at which judgment begins to develop and the mind takes pleasure in thoughtful discussions.

I am not aware that there are any similar text books for use in this country, although the need of something of the kind has been frequently acknowledged. We may hope that the example of these French authors will prompt some bright spirits among ourselves to venture in the same direction.

SCHOOL HYGIENE.

School hygiene is a subject that presents itself to the mind under two aspects: first, the sanitary conditions of the school-house and premises; second, the instruction on the subject that may be given to children. The teacher has primarily little to do with the former, but must be held responsible for keeping up the best conditions possible with the appliances provided. With reference to the latter division of the subject a suitable manual is very much needed.

For the following suggestions, which I believe will prove interesting and helpful to teachers, I am indebted to Dr. Charles Warren, of the Bureau of Education:

> Respecting the inculcation of hygienic information little need be said here; usually the preferable way to attain this end is to promote the formation of proper habits and the performance of hygienic duties at the right time. When these practices have become familiar enough to crystallize into habits, the best part of the instruction will have been imparted, and but little verbal instruction thereafter will be necessary.
>
> Let the teacher, for example, steadily require that the hands and faces of pupils

on entering school shall be clean and their hair and clothing neatly arranged. Patient insistence upon these points will in a short time make the pupil habitually attentive. If a word of admonition is needed, let it be spoken pleasantly and, if possible, in a striking way. The teacher need not expose a pupil whose finger nails are dirty to the merciless guying of the other children: a small slip of soft wood tapered and shaped into a nail cleaner should be given to the offender with an injunction to "keep his nails out of mourning."

The systematic use of the closets at recess and during intermissions should be seen to; in this way the regular and frequent evacuations of effete substances will become a habit and the time actually spent in study and recitation will be freed from interruption.

When the teacher sees or feels that the pupils are beginning to suffer from the temperature or impurity of the air, it is wise to call their attention to the discomfort arising from too much or too little heat or from the lack of fresh air; a few words explaining what the matter is, and how best to correct the condition, will then be received with respect; the opening or shutting of windows, air flues, and the like should then follow, the teacher training the older pupils to observe for themselves these conditions and the measures for their correction. The duty of regulating the heat, air supply, &c., should be performed by the pupils, who, in a little while, learn perfectly well the simple ways of keeping the air of the room in good condition, and are much more certain than under more formal instruction to practise at home what they learn at school.

Delicate and precocious children are difficult problems for the teacher. Whenever such children are placed in school, an early visit to some judicious neighboring physician and a quiet conversation with him about their constitutional weaknesses or developmental dangers will be most useful to the young instructor.

Let it be understood, finally, that parents instead of teachers are often responsible for the ill health of pupils. Children who are improperly fed and unhealthily dressed generally become the victims of domestic ignorance and vanity, not pedagogic carelessness or overstimulation.

EXAMINATIONS AND DIPLOMAS.

As I have already said, it is not my purpose to carry the consideration of our rural schools beyond the province of the teacher. I shall not be exceeding this limit in calling attention to certain measures which are independent of the teacher, but which affect his spirit and efficiency. Periodical and final examinations by impartial officers are needed not merely to give force and precision to instruction, but also as a means of bringing the energies of other adult minds to bear upon the mind of the teacher.

As every influence that stimulates pupils lessens the drag upon the teacher, it is well to employ some form of certificate or diploma to be awarded to pupils upon the completion of a prescribed course of study. These are measures closely connected with the work of inspection for which as yet very little provision has been made. The better supervision and inspection of the schools, the grading of the country schools, and such grading and increase of salaries as will insure to the advanced pupils of country districts more extended instruction and of a higher order, are matters which need to be set plainly before the people and which they cannot afford to neglect.

PRIMARY INSTRUCTION IN FRANCE AND BELGIUM.

Just as this circular is going to press I have received a number of documents relating to the French and Belgian systems of primary instruction. The eager desire for new ideas on the subject of elementary education which is everywhere manifest makes it seem desirable to bring the official statement of what is projected or in operation in those countries to the attention of teachers; accordingly translations of certain portions of the documents have been prepared as an appendix to this circular. The purpose in presenting this matter is not to advocate the servile imitation of what is foreign; the power and permanence of our system come from the fact that it is the expression of the will of the people, the adaptation of means to ends which they understand and approve; at the same time ours is a flexible, progressive system, and as such has a wonderful power of assimilating to itself whatever is valuable in the theory and practice of other nations.

While seeking the further advancement of our common country schools, we have no reason to ignore their past achievements and present excellence. If they may profit by ideas and practices adopted elsewhere, they have in turn valuable lessons to impart. This did not escape the notice of the royal commissioners on technical instruction, whose visit to this country is a recent event.

MR. MATHER'S OPINION OF OUR RURAL SCHOOLS.

Mr. William Mather, who was specially appointed to inquire into technical education in the United States and Canada, has thus expressed in his official report his impressions of our rural schools:

The district schools in the rural parts of the counties are conducted on the basis of the city schools, excepting that the recognized school period is twenty weeks in the year instead of forty. These schools have attracted some special attention in America on account of the general intelligence and aptitude for the industrial arts displayed by the scholars on entering upon employment in the cities. In the New England States especially (Massachusetts, Maine, New Hampshire, Vermont, Rhode Island, and Connecticut), the absolute necessity for children over ten years of age to assist on the farm in the summer months has rendered it imperative to blend school and farm work in such a way that the parents may have assistance while the children's teaching is not sacrificed. The stony and somewhat sterile lands of New England require intense activity, industry, and skill on the part of the farmer to make a living. As hired labor is very dear, he depends on his own household for help. Every kind of work has to be done at home. Blacksmith's, wheelwright's, machinist's, carpenter's, and hydraulic work become as familiar to the farmer, in a rough and ready way, as ploughing, tilling, sowing, and reaping. All handicrafts, in a greater or less degree, are acquired. The farmer's boy is thus provided with an industrial training of the best kind in and around his home. His wits are sharpened, his perceptions developed; there is a large field for the immediate application of knowledge acquired at school on the one hand; on the other, the school exercises and lessons are more readily understood by a boy or girl having in daily life to deal directly with natural forces and laws. These county or district schools, associated as they are with agricultural and mechanical occupations, produce better results, as a whole, amongst the artisan classes than the city schools, the attendance at which is for the entire school

year of forty weeks. My attention has been drawn to this fact by many employers and educationists, and it has been confirmed by my own observations. It suggests the importance of introducing into the elementary public schools of cities some industrial training. "Our brightest boys come from the country" is a phrase which has become very familiar to me in America.

HELPS FOR THE TEACHER.

In addition to suitable furniture, every country school ought to be provided with blackboards, outline maps and globe, numeral frame, set of geometrical forms, set of color cards, Webster's or Worcester's unabridged dictionary, encyclopedia, and gazetteer. To this extent, at least, material and reference books should be furnished out of the public funds.

No teacher should be without one or more educational journals, which are full of information on all points relating to the progress and conduct of schools.

It is, also, important that every teacher should have access to a carefully selected (although it may be a small) library of professional works.

The following list of books appropriate for such a library is suggested by the librarian of the Bureau of Education:

List of books suggested as appropriate for a library for teachers.

Name of author.	Title of work.	Publisher.	Size.	Pages.	Price.
	PHYSICAL EDUCATION.				
Blaikie, William	Sound Bodies for Our Boys and Girls	New York, Harper & Bros., 1883	16°	11+168	$0 40
Carpenter, W. B.	Animal Physiology	New York, Scribner & Welford, 1884	12°		2 40
		London, H. G. Bohn, 1859	12°	12+604	
Hartelius, Dr	Home Gymnastics according to Ling; translated by C. Lofving				
Huxley, T. H	Lessons in Elementary Physiology	New York, Macmillan & Co., 1883	16°		1 10
Huxley, T. H., and Youmans, W. J.	Elements of Physiology and Hygiene	New York, D. Appleton & Co., 1884			1 50
Jolly, William	Physical Education and Hygiene in Schools	London	8°		
Steele, J. D	Fourteen Weeks in Human Physiology	New York, A. S. Barnes & Co., 1883	12°	238	1 00
Do	Hygienic Physiology, with special reference to the use of alcoholic drinks and narcotics.	do			1 17
	PSYCHOLOGY AND ETHICS.				
Beneke	Elements of Psychology; translated by Parker				
Brooks, Edward	Mental Science and Methods of Mental Culture	Lancaster, Pa., Normal Publishing Co., 1883	8°	504	
Locke, John	Essay on the Human Understanding				
McCosh, James	The Emotions	New York, C. Scribner's Sons, 1880	12°	9+255	2 00
Do	The Intuitions of the Mind Inductively Investigated	London, J. Murray, 1860	8°	8+504	
		New York, 1866	8°		
Peabody, A. P	A Manual of Moral Philosophy	New York and Chicago, A. S. Barnes & Co., 1883			1 25
Porter, Noah	The Elements of Intellectual Science	New York, C. Scribner's Sons, 1884	8°	563	3 00
Rosenkranz, J. C. F	Philosophy of Education; or, Pedagogics as a System. Translated from the German by Anna C. Brackett.	St. Louis, Mo., R. P. Studley & Co., 1872	8°	148	
Stephen, Leslie	The Science of Ethics	New York, G. P. Putnam's Sons, 1882	8°	28+462	4 00
Sully, James	Outlines of Psychology	New York, D. Appleton & Co., 1884			
		London, Longmans, Green & Co	8°	711	
Watts, Isaac	The Improvement of the Mind	New York and Chicago, A. S. Barnes & Co., 1883			50
Wayland, Francis	The Elements of Intellectual Philosophy	Boston, Phillips, Sampson & Co., 1854	12°	426	
Do	Elements of Moral Science	Boston, Gould & Lincoln, 1878	18°	228	

List of books suggested as appropriate for a library for teachers—Continued.

Name of author.	Title of work.	Publisher.	Size.	Pages.	Price.
	LOGIC.				
Jevons, W. S	Elementary Lessons in Logic	New York, Macmillan & Co., 1881	16°	12+340	$0 90
Mill, J. S	System of Logic, Ratiocinative and Inductive	New York, Harper Bros., 1869	8°		2 00
	THEORY AND PRACTICE OF EDUCATION.				
Bain, Alex	Education as a Science. (International Science Series)	New York, D. Appleton & Co., 1879	12°	453	1 75
Craig, A. R	The Philosophy of Training; or, the Principles and Art of a Normal Education.	London, Simpkin & Marshall, 1847	12°	20+378	
Farrar, F. W	Essays on a Liberal Education	London, Macmillan & Co., 1868	8°	8+384	
Hewett, E. C	A Treatise on Pedagogy for Young Teachers	New York and Cincinnati, Van Antwerp, Bragg & Co., 1884.	12°	228	1 00
Hill, T. H	True Order of Studies	New York, G. P. Putnam's Sons, 1884	12°		1 25
Locke, John	Some Thoughts Concerning Education	Syracuse, N. Y., C. W. Bardeen, 1884	24°	192	25
Do	Same. Edited by Rev. R. H. Quick	Cambridge, England, University Press, 1880	12°	240	
Milton, John	Tractate on Education				
Payne, Joseph	Lectures on the Science and Art of Education	New York, E. L. Kellogg & Co., 1884	16°	256	1 00
Rousseau, J. J	Émile; ou, de l'Éducation	New York, W. R. Jenkins, 1884			1 75
Spencer, Herbert	Education; Mental, Moral, and Physical	New York, D. Appleton & Co., 1884	8°	283	1 25
Tate, Thomas	The Philosophy of Education	Syracuse, N. Y., C. W. Bardeen, 1884	16°	16+330	1 50
	PRACTICE MAINLY.				
Atwater	School Government				
Baldwin, J	The Art of School Management	New York, D. Appleton & Co., 1881	12°	504	1 50
Brooks, Edward	Normal Methods of Teaching	Lancaster, Pa., Normal Publishing Co., 1879	12°	504	
		Philadelphia, Pa., Sower, Potts & Co., 1883			1 75
Currie, James	Principles and Practice of Common School Education	Cincinnati, R. Clarke & Co, 1884	12°		1 50
		London, W. Stewart	12°	504	
Do	Principles and Practice of Early and Infant School Education	London, Thomas Laurie	12°	310	
		New York, E. Steiger & Co., 1884			2 00
Fearon, D. R	School Inspection	London, Macmillan & Co., 1876	8°	100	
Gill	Introductory Text-Book to School Education, Method, and School Management.				

Northend, Charles	The Teacher's Assistant	New York and Chicago, A. S. Barnes & Co., 1883	12°	358	1 26
Page, D. P	Theory and Practice of Teaching	New York, A. S. Barnes & Co., 1883	8°	358	1 25
Swett, John	Methods of Teaching	New York, Harper & Brothers, 1880	12°	14+326	1 25
Wade, A. L	A Graduating System for Country Schools	Boston, New England Publishing Co., 1881	12°	18+451	
Wickersham, J. P	Methods of Instruction	Philadelphia, J. B. Lippincott & Co., 1883	12°	496	1 54
Do	School Economy	do	12°		1 30
	EDUCATIONAL METHODS.				
Ascham, Roger	The Scholemaster; with notes by J. E. B. Mayor	London, Bell & Daldy, 1863	12°	8+296	1 50
		New York, E. Steiger & Co., 1884			2 40
Barnard, Henry	Pestalozzi and Pestalozzianism	New York, F. C. Brownell, 1859	8°	230	
Browning, Oscar	History of Educational Theories	New York, Harper & Bros	16°		55
		London, C. Kegan Paul & Co			
Hall, G. S	Methods of Teaching History	Boston, Ginn, Heath & Co., 1883	12°		1 20
Marenholz-Bülow, Bertha von.	Reminiscences of Friedrich Froebel; translated by Mrs. Horace Mann.	Boston, Lee, Shepard & Co., 1877	16°	359	1 50
	Letters from Hofwyl on the Educational Institutions of De Fellenberg.	London, Longman, Brown, Green, and Longmans, 1842.	12°	12+372	
	HISTORY OF EDUCATION.				
Brockett, L. P	History and Progress of Education; by Philobiblius, with an introduction by Henry Barnard.	New York, A. S. Barnes & Co	12°	310	
Hailmann, W. N	Twelve Lectures on the History of Pedagogy	New York and Cincinnati, Van Antwerp, Bragg & Co., 1883.			60
Mahaffy, J. P	Old Greek Education	New York, Harper & Bros., 1882	16°		75
Raumer, K. G. von	Geschichte der Pädagogik, 4 vols	Stuttgart, S. G. Liesching, 1846-1854	8°		
Schmidt, Henry	History of Education	New York, Harper, 1842	18°	340	
	LIVES OF EMINENT EDUCATORS.				
Laurie, S. S	John Amos Comenius: His Life and Educational Works	London, C. Kegan Paul & Co., 1881	12°		
Mann, Mrs. Mary	Life of Horace Mann	Boston, Walker, Fuller & Co., 1865	8°	12+609	
Quick, R. H	Essays on Educational Reformers	Cincinnati, Robert Clarke & Co	12°		1 50
Raumer, K. G. von	Life and System of Pestalozzi; translated by Tilleard				
Stanley, A. P	Life and Correspondence of Thomas Arnold, D. D	Boston, Fields, Osgood & Co., 1870	8°	400	
	MISCELLANEOUS.				
Adams, Francis	Free Schools in the United States	London, Chapman & Hall, 1875	8°	309	
Combe, George	Education, its Principles and Practice; edited by William Jolly	New York, Macmillan & Co., 1879	8°	76+772	5 60

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List of books suggested as appropriate for a library for teachers—Continued.

Name of author.	Title of work.	Publisher.	Size.	Pages.	Price.
	MISCELLANEOUS—Continued.				
Cousin, Victor	Report on the State of Public Instruction in Prussia; translated by Mrs. Austin.	London, 1834	16°		
		New York, Wiley & Long			
Davis, Emily	The Higher Education of Women	London and New York, Alex. Strahan, 1866	8°	191	
Grey, Maria G., and Shirreff, Emily.	Thoughts on Self-Culture, addressed to Women				
Kiddle, Henry, and A. J. Schem.	Cyclopedia of Education; edited by Henry Kiddle and Alexander J. Schem.	New York, E. Steiger, 1877	4°	6+868	$4 00
Do	Dictionary of Education and Instruction	New York, E. Steiger, 1881	12°	329	1 50
Mann, Horace	Lectures and Annual Reports on Education	Boston	8°		3 00
Mill, J. S	Inaugural Address; delivered to the University of St. Andrews February 1, 1867.	London, 1867	8°		
Pestalozzi, Johann Heinrich.	Lienhard und Gertrud	Leipzig	16°		40
Randall, S. S	History of the Common School System of the State of New York	New York and Chicago, Ivison, Blakeman, Taylor & Co., 1871.	8°	477	
Siljeström, P. A	The Educational Institutions of the United States; translated by Frederica Rowan.	London, J. Chapman, 1853	12°	16+415	
Stodart, M. A	Principles of Education, especially that of Women				
Youmans, E. L	The Culture Demanded by Modern Life	New York, D. Appleton & Co., 1884	12°		2 00
		London and New York, Macmillan & Co., 1867	8°	8+423	
	American Annals of Education, 1831–1839; 9 vols				
	American Journal of Education, 1826–1830	Boston, New England Publishing Company	8°		
	Barnard's American Journal of Education, 1856–1880; 30 vols	Hartford, Conn	8°		
	Institute and College of Professional Teachers, 1834–1840; 4 vols				
	Proceedings of the American Institute of Instruction, 1830–1881				
	Proceedings of the National Teachers' Association				
	Reports, circulars, and other publications of the Bureau of Education.	Washington, Government Printing Office	8°		

APPENDIX.

PRIMARY INSTRUCTION IN BELGIUM.

PRIMARY COMMUNAL SCHOOLS.

LEGISLATION.

Each commune of the kingdom is to have at least one primary school, situated in a convenient locality.

Two or more communes may unite so as to establish or maintain a school. They may even be required to do so by means of a royal decree, the communal councils and the permanent committee having given their opinion on the subject.

The government, after considering the report of the communal council and the permanent committee, is to decide upon the least number of schools which each commune may maintain, as well as the number of classes and teachers for each school. The government determines the schools for each sex and those where both sexes are admitted (Art. 2).

Religious instruction is left to the family and to ministers of different denominations.

One part of the school building is to be placed at the disposal of the ministers, so that they may give religious instruction, before or after recitations, to the children attending school from their parishes.

Primary education comprises morals, reading, writing, elements of arithmetic, system of weights and measures, elements of the French, Flemish, and German languages (according to locality), geography, Belgian history, elements of drawing, knowledge of geometric forms, elements of natural sciences, gymnastics, singing, and needlework for girls.

Other branches may be added in localities where it is deemed advisable. A royal decree is to indicate the additional branches, as well as the reason for such increase of the list for the commune.

Text books are to be examined by the council appointed to judge of such matters (conseil de perfectionnement), then to be approved by the government.

The teacher must not neglect any opportunity of inspiring the pupils with a love of country and the national institutions.

The teacher is to abstain at all times from any remarks against the religious belief of the families whose children are confided to his care.

GENERAL RULES (*decree of August* 16, 1879.)

The instructor is to have constant care for the physical, intellectual, and moral education of the pupils under his charge. He is to see that moral duties are understood, loved, and practised. He is to watch carefully that pupils observe all rules of propriety at all times.

Primary instruction covers necessarily the branches mentioned in the first paragraph of Art. 5 of the law of July 1, 1879.

Only those books may be used which have been approved of as in accordance with the law.

The teacher must conform in all methods of instruction to the regulations given by the minister of public instruction.

The distribution of work in the various branches of instruction is to be arranged by the head teacher, countersigned (visé) by the cantonal inspector, then ordered (or published) by the municipal authorities. This program is to be placed on the wall of the school room.

The head teacher and assistants are forbidden to make any changes in the program.

Both principal and assistants are to keep a daily record of the instruction in each class, the quality of recitations, &c.

The assistants and employés about the building are to be under the orders of the head teacher or whosoever takes his place.

The school yard is to be opened at least a quarter of an hour before the recitations commence.

The head teacher and the assistants are to watch over the pupils when they enter and leave the school room and during the recess.

Head teachers and assistants must not have their attention turned aside during the recitations from the exercise of instructing their pupils.

The classification of pupils in the different divisions belongs to the head teacher, or in certain cases it may be referred to the cantonal inspector.

The head teacher is to keep an eye on the pupils, so that they do not waste their time.

The head teacher and assistants are forbidden to show any preference for any bright pupil to the neglect of others, either by reason of desiring to make a fine effect at the examinations or for any reason whatsoever. The instruction should be distributed equally among the pupils.

The head teacher is to see that proper care is taken of the building and its appurtenances. He is to have a care that there is nothing about which might affect the health of the pupils. He is to see that the school room is always neat and that it is cleaned at least once a day. The room should be ventilated before pupils enter and after they leave.

In localities where the physicians of the poor receive a salary from the board of health (bureau de bienséance) they are expected to visit the public schools at least once a month.

At the close of the visit they are to report the sanitary condition of the pupils to the proper authorities (collége échevinal).

Any pupils attacked by a contagious disease are to be sent home, and they cannot enter the school room again until a certificate, stating that they are entirely cured, has been obtained from the physician.

PROGRAM OF EDUCATION.

The program of education to be given in primary communal schools was determined by the ministerial decree of July 20, 1880. We take from the circular explanatory of the program some passages which show the object the government has had in view:

If it is important that the program should neither alarm nor discourage any one, it is of supreme necessity that it should offer serious obstacles to routine and become an instrument of progress; that it should compel the teacher to awaken in his pupils a spirit of observation, experiment, and reflection; that instead of habituating him to the disastrous methods of verbalism it should urge him to labor for the sound development of the faculties. It should constantly be a reminder to him that his last as well as his first daily duty is to make a thorough preparation of his lessons, that is to say, to find out the surest, shortest, and most attractive way of making his instruction reach the minds and hearts of his pupils.

The program ought to fulfil another important condition. It should stimulate

the teachers in small communes, while it responds to more general requirements. It should arouse them and encourage them to lead their pupils as far as the extreme limits of primary education properly so called will permit. But it should not become an obstacle in the path of improvement in larger communes which may wish to extend the education of their children beyond the ordinary sphere. In order to comply with these different principles the plan of study has been divided into two great sections, the program of the primary school proper and of the superior primary school.

The program of the primary school proper is obligatory throughout and embraces three successive courses or grades of two years or more each. In schools where the attendance is regular the first or elementary grade will include, as a rule, children of from 6 to 8 years of age; the second, children of 8 to 10; and the third, those from 10 to 12 years of age. It is not the intention of the government to prescribe in an absolute way the precise time to be devoted to studying the subjects assigned to each grade. It contents itself with requiring that these three great stages of school life should be clearly marked in each school, and it is also convinced that the majority of children will be able to pass them without too much effort between the ages of 6 and 12, and very easily between 6 and 13 or 6 and 14 years of age.

It belongs to the inspectors, the communal governments, and the teachers to adapt the program to the needs of each locality by distributing the subjects of study among the different school years and divisions and by selecting the points which will only be treated summarily and those which, according to the longer or shorter time at the disposal of the teachers, can be studied more deeply.

Besides the obligatory subjects enumerated in Art. 5 of the law of July 1, 1879, the program of primary schools includes two elective studies: a language (French for Flemish or German localities, or German for Walloon districts) and elementary notions of agriculture, horticulture, and arboriculture. Instruction in these two branches will be organized in accordance with the regulations of the royal decree of April 25, 1880.

The superior primary school can only be established by virtue of the same decree. It will be opened for children of at least twelve years of age who have finished the studies of the third grade of the primary school. Instruction in each of these schools will be given by one, and, if necessary, two special teachers. The superior primary schools will offer great advantages to the large rural or industrial communes which have no secondary state schools. They will continue the general education of the young, furnish preparatory training for an agricultural or professional career, and diffuse among the population, by an extension of knowledge, a taste for observation and for intellectual pleasures.

Communes which cannot organize a complete superior primary school may add to the obligatory program of the ordinary primary school one or more of the subjects of study of the superior primary school, in accordance with the regulations of the abovementioned royal decree, such studies to be pursued only by pupils of at least 12 years of age. In the interest of the scholars care will be taken that the number of studies thus added shall be as restricted as possible.

As formulated, the program of primary education, with the extensions it may receive, embraces four concentric circles gradually widening, each of which embraces all the subjects of study. These four progressive courses, the first three of which are obligatory, are characterized by being at once independent and connected, each forming a whole in itself and yet being complemented by the others. The system adopted, so eminently suited to the simultaneous development of all the faculties of a child, also has the advantage of corresponding in its first three courses to the present classification of scholars into the lower, middle, and superior divisions, and is adapted at the same time to the needs of children who leave school without having finished a full course of primary studies.

By offering all the subjects of study in each grade, according to the measure of the intellectual powers of the children, the latter are enabled to reap from their attendance at school much more solid advantages than could be gained from instruction in fragmentary courses graded in successive stages.

Instruction in morals.—The official program determines the office of the teacher as regards moral instruction, as follows:

Moral instruction is the noblest and most important work of the school, and the teacher must devote all his energies to it. He is to employ all the resources of his mind and heart in making easy to his pupils the practice of their duties to themselves, their parents, their superiors, their equals, and their country.

Instruction in duty to God belongs more especially to the different religious beliefs, but by making use of an idea common to all of them without entering on dogmatic ground the teacher can find occasion to talk to his pupils about the Deity, the soul, and those great moral and Christian truths which, to the honor of humanity, have progressively become the domain of all religious and the inheritance of all civilized nations. (Ministerial circular of July 17, 1879.)

It is principally by his administration of the school that the teacher will inculcate

morality. The dignity of his acts and language, his respect for justice, his sincere regard for his pupils, will enable him to establish a wise discipline and assure him the respect and love of his scholars. Thus holding the position of a good father of a family he will endeavor to give instruction which, like that of the domestic hearth, breathes simplicity, goodness, and virtue.

He will take advantage of all the school exercises, recreations, sports, and promenades, and the thousand incidents of school life to enlighten the consciences of his pupils, strengthen their good and check their evil propensities, and exercise and cultivate their wills in good directions. He will endeavor to inspire respect for truth and justice, develop a spirit of charity and tolerance, and incite a love of work and economy.

He will seek opportunities for rendering his pupils sensible to the beautiful in nature, in art, and in a moral life, and thus profit by the influence which esthetic culture exercises on the education of the feelings.

The character of the primary school is opposed to providing for it a course of moral didactics made in accordance with a plan devised beforehand. What a child needs is the good example of his teacher and of his comrades, moral instruction in action, a spontaneous lesson which comes now from something he reads and now from some aspect of nature, at one time from a passage of history and at another from a fable. There is no objection to giving certain lessons at fixed hours every week on some story, fable, or historical or literary extract. The teacher may make the selections in the reader or classical manual, and arrange them so as to present in a concrete and entertaining form the principal moral duties of a child. Short pieces of poetry, selected with discretion, offer valuable resources. They induce a love of nature, strengthen the patriotic sentiment, and refine the moral sense.

Schedule of work.—The number of hours of lessons and other exercises a week is as follows: In the first or elementary grade, 25 hours; in the second grade, 28 hours; in the third grade, 28 hours; and in the superior primary schools, 30 hours.

Examinations.—Competitive examinations take place annually for pupils of the superior division of primary schools.

The law of August 24, 1883, on electoral reform, gives the right of voting in provinces and communes to pupils of the primary schools who have obtained certificates in these examinations.

TEACHING GEOMETRICAL FORMS IN THE PRIMARY SCHOOL.

The Belgian primary school attributes much importance to the study of geometrical forms. This branch furnishes excellent means for intellectual development. It lays the foundation of instruction in drawing and forms an admirable preparation for different trades (carpentry, masonry, locksmithing, &c.).

The inspectors are careful to see that the instruction is essentially practical and given by inspection only, that scientific demonstrations are prohibited, and that the teacher is sparing in definitions. It is enough for the pupils to recognize the forms by perceiving their relations, and be able to reproduce them in a drawing and by one of the methods borrowed from the Fröbel system (by bending, constructing figures of pieces of wood, &c.).

Our method, therefore, is not that of scientific geometry, with its theorems, corollaries, and problems. It is entirely based on inspection and practice, and is only the natural development of what takes place in Kindergärten.

The essential point is that pupils know how to draw or construct the geometrical forms and know their leading properties, with the measure of their areas and volumes.

SCHOOL HYGIENE.

The inspection of school hygiene under the central administration of the department of public instruction includes the three degrees of education. As far as primary education is concerned the inspectors are charged with the examination of building sites, plans of construction and of improvements and extensions of school buildings. Their main duty is to see that the approved proposals are in accordance with the just demands of hygiene and pedagogy. They are also very particular to insure that the designs for schools conform to the requirements of simplicity and good taste.

Since its organization the bureau of inspection has brought about great reduction in expenses by opposing extravagance in façades and in general furnishing.

It has drawn up a program for the construction of normal schools which has been adopted by the department. This program has facilitated the work of the architects and has enabled them to effect very considerable savings in making new estimates and plans.

The examination of school designs is not, however, the only mission of the inspectors of school hygiene.

When there are different opinions as to the best sites to choose for schools or when improvements or extensions of existing buildings are under discusion, they visit the spots designated, make examinations, and report to the department for its guidance.

It is also the duty of the inspection bureau to make a practical organization, as far as the school is concerned, of the physical, intellectual, and moral hygiene of the children. It is important that the impulse to study in all school grades should be regulated in accordance with the laws of human nature by applying the principles of hygiene, which require an equilibrium of the physical forces and the intellectual faculties.

A program based on these principles is vast. It can only be prepared by methodically concentrating observations made in all parts of the country. To accomplish this, researches of two kinds are necessary. The hygienic situation of all school buildings must be ascertained, so as to apply to them the improvements which may be found necessary, and, what is of no less importance, the inspectors must prepare a system of regular medical inspection of all educational institutions in the whole realm. At present this can only be done in the larger cities.

PRIMARY INSTRUCTION IN FRANCE.

ELEMENTARY PRIMARY SCHOOLS.

Every parish (commune) must maintain one or more primary schools. (Law of March 15, 1850, Art. 36.) Every parish of 500 inhabitants and more is bound to have at least one public primary school for girls distinct from the boys' schools. (Law of April 10, 1867, Art. 1.)

The number of public schools for boys and girls to be established in each parish is fixed by the conseil départemental de l'institution publique on the advice of the municipal council. (Law of April 10, 1867, Art. 2.) In parishes the population of which is under 400 inhabitants the schools are mixed and may receive boys and girls together.

Education in public primary schools is free. (Law of June 16, 1881.)

The pedagogical organization of the primary schools and the plan of studies to be followed in them have been regulated and determined by the minute of July 27, 1882.

Primary instruction is divided into three courses: (1) Elementary, lasting two years, for children aged 7 to 9; (2) intermediate (cours moyen), lasting two years, for children aged 9 to 11; (3) superior, lasting two years, for children from 11 to 13 years of age.

The departmental council fixes the regulations of the schools in each department from the general instructions of the official regulations decided on by the education minister with the assent of the conseil supérieur.

In each course the children must receive a threefold training, consisting of (1) physical education; (2) intellectual education; (3) moral education. The ordinary obligatory curriculum of intellectual instruction comprises reading, writing, arithmetic, the elements of the natural sciences, geography, history of France, drawing, and music, and is strictly carried out in all the town schools and in many of the country

ones. Some of the schools have cabinets of minerals, botanical specimens, science and art museums, and nearly all possess graphic illustrations of physical and political geography, raw materials, and manufactured products. The simplest of these illustrative collections (e. g., those of Deyrolle) are supplied gratuitously to the poorer communal schools by the education department. Instruction in manual work has of late been introduced into a considerable number of the primary schools. Almost all the primary schools of Paris and large towns (Lyons, Marseilles, Rennes, &c.) have workshops attached to them. Special inspectors of manual work have been appointed, who determine the quantity of work to be done and judge of its quality.

The whole of the instruction in a class or division, as the case may be, is generally conducted in a separate room. The hours of instruction are from 8 A. M. to 4 P. M., with one and a half hours' interval at noon, and an hour from 4 to 5 for gymnastics. The same master gives all the lessons to a class, except music, gymnastics, and occasionally drawing, in the male and needlework in the female schools. Pupil teachers, as assistants, are permitted by law, but the employment of them has been generally discontinued.

In many of the large cities the children take their dinners in the school. In some cases a kitchen is provided and the whole or a portion of the cost of preparing food is borne by the school authorities. In the poorer districts of Paris a portion of the cost even of the food itself is defrayed by the municipality, and in extreme cases the authorities provide boots and clothing for the children on the recommendation of the master.

Corporal punishment is strictly forbidden in French schools of every grade.

Primary instruction is compulsory for children of both sexes, including the blind and deaf-mutes, from the beginning of the seventh to the end of the thirteenth year.

In every commune (there are about 36,000 communes in France), besides a school attendance board, there must be a school board composed of the mayor, of certain persons to be appointed by the inspector of the académie, of the inspector of primary schools of the department, and of a number, not exceeding one-third of the whole board, of persons elected by the council of the commune. (There are special provisions as to the composition of this board in the case of Paris and Lyons.)

Children may present themselves for examination for the "certificat d'études" at the age of 11, and, on passing it, are to be exempted from further compulsory primary instruction.

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CIRCULARS OF INFORMATION

OF THE

BUREAU OF EDUCATION.

No. 7—1884.

AIMS AND METHODS OF THE TEACHING OF PHYSICS; BY PROFESSOR CHARLES K. WEAD, A. M., OF THE UNIVERSITY OF MICHIGAN.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1884.

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LETTER.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., October 10, 1884.

SIR: The wide diversity of practice among American and foreign colleges and secondary schools both as to the extent to which the subject of physics should enter into courses of instruction and as to the way in which it should be taught has long been a source of deep regret to teachers of science and educationists generally. As long ago as 1867 a committee of the British Association for the Advancement of Science made a report to that body on the subject in which the whole field of inquiry was covered and other reports have been made to it at various times since. For several years the American Association for the Advancement of Science has had a standing committee on science teaching in the public schools. In 1880 this committee made a report "On certain radical deficiencies in current science teaching," which was printed in the Popular Science Monthly of that year. Two years later Prof. T. C. Mendenhall, vice president of the section of physics, suggested that a progressive scheme of study in physics fitted for the needs of all the schools could be best drawn up by a committee from the National Educational Association and the American Association for the Advancement of Science.

As those prominently engaged in this work believed that the Bureau of Education could efficaciously exert itself in collecting the numerous facts and opinions from which a conclusion that would secure general acceptance might safely be drawn, I acted on their suggestion, and engaged Prof. Charles K. Wead, A. M., acting professor of physics at the University of Michigan, to draw up a set of inquiries about the teaching of physics and collate and discuss the answers which should be received. After close study of the question and correspondence with teachers of physics, he has transmitted to me in the accompanying very satisfactory work the results of his labors, and I have the honor to recommend that the material here presented should appear as a circular of information.

Very respectfully, your obedient servant,

JOHN EATON,
Commissioner.

The Hon. SECRETARY OF THE INTERIOR.

Publication approved.

M. L. JOSLYN,
Acting Secretary.

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AIMS AND METHODS OF THE TEACHING OF PHYSICS.

CHAPTER I.

INTRODUCTION.

In the fall of 1883 the Commissioner of Education sent out the circular and inquiries about the teaching of physics given on pages 14 and 15. The results of inquiries made in 1878 showed the most serious diversity in the schools in methods and arrangements for teaching physics; serious, not because of the diversity, but because of the ignorance either of the subject or else of its proper place in education which that diversity revealed. The present inquiry was suggested as the easiest and best first step toward an improved condition of affairs.

To this end the inquiries were sent to a number of schools or individuals selected by the Commissioner, and the seventy replies are herewith given. For brevity and in the hope of making them more readable than if the questions were omitted entirely, the answers have been rewritten just enough to include the questions, any peculiar, emphatic, or hesitating expression being carefully given. The list of names will probably be recognized as a fairly representative one, including schools of all grades and in all sections of the country. Whatever the reader's answer to the question may be, he will be almost sure to find it given here by some one and in a vigorous way.

As the object of this work is not to prescribe or advise how and when physics should be taught, but to collect material representing all shades of opinion, in order to help the teachers of the country toward clearer and more uniform views on these points, it has seemed proper to supplement the brief replies by extracts showing what has been done in some places in our own country, and what is aimed at in foreign countries by the authorities and other writers worthy of attention. Fortunately there is little need to-day, and none in this place, of arguing for the study of the sciences: so far as the extracts touch at all on this general point it is for the purpose of showing *how* they should be taught and what ends they should subserve in education. Some of the extracts may help in deciding between physics and this or that other science study, while many of them should suggest much that ought to be done—to some teachers perhaps what should be left undone. The

uniformity in the spirit of the extracts may suggest that the selection has been intentionally one sided; but this is not the case, for the writer has not been able to find in print a single article which advocates what may be called, for want of a recognized name, the non-inductive, dogmatic, or didactic method of teaching, and which points out the limitations and difficulties of the inductive method.

Naturally, we inquire with special interest to know what has been done in England, but the result is disappointing. In spite of the long and vigorous agitation in favor of science teaching the results that can be shown by official documents are slight and complex. Still it has seemed best to give the results of the examination, if only to save others the labor of hunting up the facts for themselves. Of very great value, however, are some of the extracts quoted from English teachers. It is hoped that no undue space has been given to them, for the temptation was strong to quote much more.

In the arrangement of the material, Chapter II contains the replies, which will of course be recognized as the most important part of this work. The value of the individual opinions can be judged only by reading each reply as a whole, not by extracts from it or by the table. The replies are grouped under four heads, viz, those from (1) normal schools, public or private; (2) secondary schools, public or private; (3) universities and colleges; (4) unclassed sources. Under each head the arrangement is geographical rather than alphabetical, to allow of immediate comparison between neighboring schools. Table I will serve as an index to the replies.

Chapter III contains official programs from some European countries, statements of what is actually being done, extracts from addresses, &c. From our own country we learn of some of the steps being taken to unify the work in physics; of the colleges requiring physics for admission; and of the courses in science adopted in a few of the many city schools whose reports have been examined. In Boston and St. Louis attention has been directed so long to science teaching that a pretty full statement of the work in these cities seemed advisable. Undoubtedly our American journals contain much of value for the present purpose, but for want of time only one or two of them have been searched.

In Chapter IV the attempt is made to arrange under suitable headings the matter collected in the previous pages and to discover that consistent scheme of physics study which is favored by the majority of the contributors. The writer disclaims any desire to speak ex cathedra. His attempt is to give every view, pro or con, its full value, and he hopes that no important point is overlooked. In its broad outlines the course advocated by the majority is found to be a very definite one, for on many points there is little difference of opinion. It may seem that the views of the minority receive undue weight, but this is generally because they

cannot be condensed so well and are not so generally repetitious of one another.

It will not be overlooked that the replies, and all official courses of study as well, state what is *desirable;* the ideal is always set somewhat beyond the point already attained. For the present purpose this is well, for we may feel that these ideals will not have to be changed greatly within a few years. There still remains much to be done in showing with some detail how the schools of various grades can work more successfully in the directions here indicated. This labor we may hope will be undertaken by some of the educational associations. It needs the experience of the many, not the labors of one; but all teachers can help in the way suggested in the concluding pages. Meantime the hope may be expressed that the present collection of opinions and results of experience at home and abroad may help many readers to settle more clearly in their own minds what should be aimed at, and so to some extent assist in removing the great obstacle that is constantly pointed out—poor teaching.

In the appendix, Table I gives such of the replies as can be compressed satisfactorily into this form. Where there is danger of misleading, a dagger (†) refers to the full reply. In other cases it is hoped the only danger of misconstruction is that arising from the omission of a qualification in such expressions as "yes, if possible," "probably," "not less than one year," "one year is ample time," &c. If, in answer to the question whether the work in the high school should be prosecuted by the inductive or by the deductive method, for information or for discipline, any preference is shown for either alternative, that one alone is entered in the table, since, obviously, the only use of the question can be to discover what should be the *main* or *primary* object of the work. Scarcely any writer asserts distinctly that it is desirable or possible to confine the teaching to either alternative alone. Similarly, if it is said "both with and without text book," the answer is given in the table as "yes."

To enable the reader to judge of the size and character of the school from which any reply comes, a reference is added to the table in the Report of the Commissioner of Education for 1882–'83, where statistics of the school are given.[1]

Table II gives a comparative exhibit of the kind and amount of continuous science teaching in some schools, viz, in the Prussian Gymnasien, the French lycées, and the Boston and St. Louis public schools.

The appendix contains also a list of the principal books that are the authorities for statements made in the text or that are referred to in it or in the replies, provided they can be procured through the ordinary trade channels; hence school reports and various other documents are excluded. The list of school books is not intended to include any titles except the few just indicated.

[1] This volume was received too late for use in other parts of this discussion.—C. K. W.

It may prevent misunderstanding and uncertainty if attention is called to two or three familiar things:

1. The period of study is understood to be divided as proposed in the plan of the National Educational Association, viz, four years each in the primary and grammar departments and the same time in the high school. In nearly all countries primary education, including the work of these first two departments, ends at about the age of fourteen. In the replies before us these two are included, often without distinction, under the title "lower schools," since the name "primary" is ambiguous.

The name "high school" is used for brevity to include academies, seminaries, preparatory schools, and all other secondary schools.

The higher education, given in colleges, &c., does not include in the present discussion professional or technical education; here we have to consider only what is desirable for the majority of students seeking a liberal training.

2. Some common expressions are ambiguous and therefore convey no definite meaning unless specially defined; thus, *practical* is a word which has been so abused that it is better to drop it from the discussion. *Science* in the French programs includes mathematics; elsewhere the writer limits it to its popular meaning: the study of material things (including, of course, natural history). *Mechanics* as used here includes all of physics not belonging to one of the other four usual divisions, including, therefore, hydrostatics and pneumatics as well as the mechanics of solids. *Laboratory work* may mean any one of several things, implying on the part of the pupil apparatus making, qualitative experiments accompanying the text book, or the higher quantitative physical measurements; or it sometimes means simply experimental demonstration by the teacher in the presence of the class or even preparation for such demonstrations. The reader will often find it difficult to discover which of these meanings is in the mind of the one who uses the word. Lastly, it is sometimes assumed that where laboratory work is introduced the teaching is *therefore* on the inductive method, a most unwarranted conclusion.

3. The ways by which the mind acquires new truth are by—

(1) Observation of phenomena.

(2) Induction of the cause, principle, or law, from the observed phenomena. This is little better than a guess in its first stages, even for an experienced investigator. Under this head would come sudden discoveries of the truth, like an inspiration, such as the familiar one reported of Archimedes.

(3) Deduction from this guess or from a principle already established. Here we may class applications of the principle, as in the construction of instruments.

(4) Experiment, to furnish phenomena or to test the deduction.

(5) Dogmatic statement or authority.

Since most of our knowledge, even of the specialist, must be derived from others, some teachers hold that it is sufficient for the student to learn from a book the principal facts, having them illustrated and made clear by experiment. They point out that at least for the standards which lie at the foundation of all quantitative work we must depend on official or scientific authorities. Other writers lay so much stress on the other four ways, especially on the second, as practically to ignore this fifth one, while some writers of this class, in advocating scientific education, seem unwilling to allow the student to learn anything from others.

Methods of teaching may be called for brevity dogmatic, deductive, or inductive, according as the *principal* reliance is placed on the fifth, third, or second of these five ways of acquiring truth; the teaching of history is an example of the dogmatic, geometry of the deductive, while science *may* be taught by any of the three methods. It is not inconsistent with the use of the deductive method to use authorities to some extent; while an inductive method, even with school boys, must *necessarily* employ deductive processes, and without sacrificing its principle or name may obtain from authorities some facts and results of experiment; definitions too must be taken mainly on authority. The study of physical instruments and other applications of principles is of course common to all three methods, and not distinctive of either of them. The replies and extracts may be examined with profit to see how far such use of authorities is considered advisable by advocates of the inductive method.

CHAPTER II.

CIRCULAR INCLOSING INQUIRIES ABOUT PHYSICS TEACHING, AND REPLIES TO THE SAME.

INSTRUCTION IN PHYSICS.

DEPARTMENT OF THE INTERIOR, BUREAU OF EDUCATION,
Washington, November 20, 1883.

DEAR SIR: In spite of the recognized position which the study of physics holds in the schools of this country, a wide diversity and some uncertainty of opinion still exist as to the reasons for its study and the best methods of teaching it.

In his report on the teaching of chemistry and physics (Circular of Information No. 6, 1880), Prof. F. W. Clarke pointed out the great lack of uniformity in the teaching of physics in schools of similar grade throughout the country and the slight coördination between the work in colleges and in preparatory schools. "In most cases the latter teach chemistry and physics to the same extent as the former and in essentially the same way. The conclusion is obvious that the colleges ought to do better work. * * * A little more coöperation in this matter would plainly be advantageous." Again, "The larger number of colleges repeat the work of the high schools and academies, giving almost exactly the same courses of elementary recitations in chemistry and physics, from the same text books, and with the same class experiments."

Such coöperation of the school authorities has long obtained in the teaching of Latin, Greek, and mathematics. In all these studies, from the rudiments up, the order of topics is substantially the same throughout the country as far as the preparatory schools go, the differences in the requirements for admission to college being mainly in the extent to which this uniform order has been followed.

If a similar coöperation could be had in the teaching of physics and the amount of work to be done in the different school grades could be settled with some uniformity, no teacher can doubt that the gain over the present diversity would be very great. Of course there are difficulties in the way of securing it, one of them arising from the constant progress that is being made in our knowledge of physical laws and another from the fact that the schools must accommodate the majority of their graduates, who do not go to college; obviously, therefore, uniformity is to be secured only as a result of full discussion and comparison of views.

To obtain most easily this comparison, I venture to request from you an early answer to the accompanying inquiries. When the replies shall have been arranged and published under their authors' names, it is hoped that sufficient uniformity may be found among them to justify the drawing up of a progressive scheme of study in physics fitted for the needs of all the schools. Such a scheme could probably be drawn up best in the way suggested by Prof. T. C. Mendenhall, vice president of Section B of the American Association for the Advancement of Science, in his address on this subject at Montreal, in August, 1882, viz, by a joint committee from the National Educational Association and the American Association. The present inquiry is instituted as a necessary prerequisite to any acceptable report from such a committee, if it is to meet with general intelligent acceptance.

JOHN EATON,
Commissioner.

INQUIRIES ABOUT THE TEACHING OF PHYSICS.

Return made by ——— ———, connected with ———, at ——— ———.

1. Do you think it desirable to introduce in primary or grammar schools any study of physics (natural philosophy)? If so, to what extent and of what character? With or without books? Can this serve as a basis for future work?

2. In high schools and academies, from which only a portion of the graduates will go to college or a technical school, how much time should be given to physics: a year of daily work (200 hours) or less? In which year of a four years' course should it come?

3. What should be the prevailing character of the high school work? Inductive or deductive? For information or for discipline? With or without text book? With laboratory work? How much mathematical knowledge should be assumed? How expensive would the apparatus be for the course you advise?

4. How much study of physics should be required for admission to college: (*a*) On a classical course? (*b*) On a non-classical course?

5. In what respects should the instruction in college differ from that described under 3:

(*a*) Of students who begin the work in college?

(*b*) Of those who have the preparation you suggest under 4 (*a*)?

(*c*) Of those prepared as suggested under 4 (*b*)?

6. Do you think that a course of study in physics can be planned that would, both in extent and character, be likely to satisfy both the schools and the colleges that require this study for admission? If so, is the common ground to be sought in such a course as is described in your answers to 3 and 4?

7. In which year of the college course should the student take up physics? For which classes of students named in 5 should plane trigonometry be a prerequisite? Should any higher mathematics be a prerequisite? Should elementary laboratory work accompany the text book and lecture work for any of the classes named in 5? Should elementary physics be a prescribed or an elective study in college?

8. A statement is very desirable of the results obtained in your experience that bear upon questions 1, 3, and 4. In what ways has the requirement of physics for admission to college proved advantageous? What disadvantages have followed it?

9. In framing the uniform scheme hoped for, it will be necessary first to agree on the main reasons for the study of physics in the preparatory schools and the ends to be aimed at. Please give briefly the reasons and aims underlying your replies to 1 and 3.

10. Will you advise me on any point pertinent to this inquiry not covered by the above questions?

Let us now turn to the replies.

I. FROM TEACHERS IN NORMAL SCHOOLS.

(1) *W. J. Corthell, State Normal and Training School, Gorham, Me.*

1. Most assuredly some study of physics should be introduced into the lower schools; to embrace elementary facts illustrative of all common laws and explanatory of all phenomena which the pupils see or can be led to observe; without books, unless a *text* book can be found. This may serve as a basis for future work.

2. In a high school course of 160 weeks one-fourth of each day for 60 weeks should be given to physics and an equal amount to chemistry, the physics coming in the first year and one term of the last.

3. The high school work should be experimental, student and teacher making apparatus; inductive first, then deductive; for both informa-

tion and discipline; with book containing statements of laws without explanation; most assuredly with laboratory work, and that by the pupil. A fair knowledge of arithmetic and the elements of algebra should be assumed. An ingenious, live teacher would do it all at a cost of $25; a dunderhead for teacher would need $500.

4. For admission to college on all courses there should be required a thorough elementary course in grammar school and a full experimental scientific course of one year and a quarter in the high school.

5. If the preliminary work has not been done, it must be done in college, as suggested under 1 and 3. Students having this preparation may take up scientific, experimental, and mathematical physics.

6. The courses above described should satisfy both the schools and colleges.

7. The college work should begin in the sophomore year, requiring plane trigonometry and no higher mathematics. Elementary physics should be prescribed for those who have not studied it before coming to college, and be accompanied by laboratory work.

8. The advantages of the study have been: (1) Wonderful quickening of the intellect; lively interest in the school. (2) Subsequent growth into the scientific and scholarly spirit, developing a wonderful ingenuity in mechanical contrivances and the manipulation of tools. (3) Doubling (in some instances now existing quintupling) the number of boys who take the high school course and giving many a strong bent to industrial pursuits in their better skilled departments. It has secured students of broader powers of thought and generalization. It has cultivated the senses so that pupils were not "nature blind." It has trained to the habit of nice adjustment of probabilities, which has reacted with marked power in giving critical acumen in classical research.

No disadvantages have followed, unless a longer time in the course and consequently riper scholarship are disadvantages.

9. No other study and no other method can train (1) the senses, (2) the habit of original investigation, (3) the power and habit of reasoning from facts discovered to principles or laws inferred.

(2) *C. C. Rounds, State Normal School, Plymouth, N. H.*

1. It is desirable to introduce into primary schools such simple phenomena as fall under the pupils' observation and as can be illustrated by simple experiments; in grammar schools something more can be added of inference from observations made or experiments performed. In primary schools orally; in grammar schools some use may be (in most cases should be) made of books. This may serve as a basis for future work.

2. In a four-years course of study in high school at least one year should be given to physics; in a shorter course perhaps less time; it should come in the second or third year.

3. The high school work should be inductive and deductive; for discipline through information; with text book and laboratory work; applying elementary geometry and algebra in addition to arithmetic. It is not proposed to answer definitely at the present writing the question of expense; I should say from $50 to $200, according to means at command. Much could be done with fifty dollars' worth of apparatus, supplemented by ability on the part of the teacher to use tools.

4. At least one year's study should be required for admission to college.

5. The college instruction for beginners should not differ at all from that of the high school; for other students it should be more largely mathematical and disciplinary.

6. The "common ground" between high schools and colleges is to be sought in the course described above.

7. For college physics, plane trigonometry should be required, and higher mathematics for a scientific course; elementary physics should be a prescribed study, and elementary laboratory work should be taken by all classes of students named in question 5.

8. For fifteen years I have known the great advantages derived, both as regards intelligence and discipline, from the careful study of physics in a normal school—Farmington, Mass. I have seen no disadvantages.

9. The information is such as all need, and the discipline obtained from the study of physics is in some respects such as can be obtained in no other way.

(3) *J. G. Scott, State Normal School, Westfield, Mass.*

1. In the lower schools physics should be introduced. The work must be elementary, prosecuted for two purposes, (1) for knowledge and (2) as a basis for language work, oral and written compositions, &c., the more the better; as a rule, without books. This may serve as a basis for future work.

2. In high schools a year or more should be given to the subject. If pupils are well prepared it does not matter much in which year it comes.

3. For ordinary high schools the character of the work should be chiefly elementary; inductive; for both information and discipline, as they are inseparable; with text book for reference only; and with laboratory work. In the present condition of our schools it is unsafe to assume much mathematical knowledge. The apparatus should be simple; otherwise pupils are "dazed," not instructed. Better make most of it themselves; the expense for each would be very little.

4. For admission to college enough of physics should be required to secure knowledge of the most important phenomena of the world about us, say of most of those treated in our common text books. No knowledge of language can atone for ignorance of nature.

5. The work in college must be elementary for beginners, scientific for those who have the preparation suggested above.

6. A course in physics can be planned that ought to satisfy the schools and colleges; but no course is likely ever to satisfy all, because teachers differ so widely in intelligence, especially in knowledge of the laws of mental development.

7. Plane trigonometry should be a prerequisite for all college students except those who begin physics; higher mathematics are very helpful. Laboratory work is indispensable for those beginning the subject. The study should be prescribed in college.

(4) *Henry E. Sawyer, State Normal School, New Britain, Conn.*

1. I think it desirable to introduce physics in the lower schools. In extent it should be entirely elementary; in character, the observation of experiments and common phenomena, with study of laws and causes; without books, except as they may be referred to or read for information. This certainly should serve as a basis for future work.

2. In high schools probably one-half year of daily work (100 hours) is as much as could well be given; it should come in the second or third year.

3. The work should be objective and experimental, followed by study of a text book; inductive; for *discipline* and information; with laboratory work if practicable. A knowledge of arithmetic and algebra through simple equations should be assumed. The apparatus would cost from \$50 to \$100, depending on the ingenuity, technical skill, and occupation of the teacher.

4. For admission to college there should be required not less than half a year's study of physics of the character indicated for high school work, presupposing suitable work in the primary course, and on a non-classical course double the amount above indicated.

5. The work in college (*a*) for beginners should not differ from that of the high schools; (*b*) should be more advanced; (*c*) should embrace original investigation.

6. I think a common ground for schools and colleges will be found in the above course.

7. In college, physics should be prescribed, unless required for admission, and should come in the second year. Elementary laboratory work should be given to class 5 (*a*), and trigonometry be a prerequisite for all students except 5 (*a*).

(5) *Sumner H. Babcock, State Normal School, Albany, N. Y.*

1. If botany is not taught in both primary and grammar schools, physics should be in the latter. The pupils should do the experimenting. They should get clear ideas of the properties of matter, of the molecule, of attraction and repulsion and their effects on the forms of matter; elementary ideas of dynamics, heat, light, and sound. Use no books. This can serve as a basis for future work.

2. In high schools at least one year, the third year, should be given to this study.

3. In the high school work so far as possible all knowledge should be obtained by the student himself performing the experiments, generally at the direction of the teacher. This should be as exhaustive as his knowledge of mathematics and the time will admit. It should be of practical benefit, inductive in character, for discipline, without text book, and with laboratory work; a knowledge of arithmetic, algebra, plane geometry, and trigonometry should be assumed. By using articles with which every household is provided and making the simpler apparatus at school or at the student's home, the cost would not be over $200.

4. For admission to college there should be required, (*a*) on a classical course, so much physics as requires no knowledge of trigonometry and can be thoroughly done in two terms; (*b*) on a non-classical course, the whole work set forth in 3.

5. In college the instruction (*a*) for beginners should not differ from that already described; (*b*) for students who have had the two-term course, it may perhaps be supplemented by the use of a text book; (*c*) for students with a year's preparation, only by giving the student at intervals certain lines of investigation to follow out experimentally; the instruction here should be more purely scientific.

6. I think a "common ground" may be found in the course described above.

7. In college, physics should be taken up in the senior year; it should be a prescribed study; plane trigonometry should be a prerequisite for those prepared and taught as suggested under 5 (*c*).

9. The reasons for the study are: No study in the primary or grammar schools develops the habits of observation: physics does; the knowledge of physics makes men better able to live well and increase the comforts of life. The aims are to discipline and develop the mind and make men practical.

10. It seems important that this course of study should be so conducted, especially in the academies and high schools, as to make the students intelligent "browsers among books." To this end, while text books as such are disused, reference books suited to the needs of the pupils should be within their reach, and the pupils should be encouraged to use them.

(6) *Austin Craig Apgar, State Normal School, Trenton, N. J.*

1. In the lower schools physics should be introduced; in the primary the subjects of sound, light, heat, electricity, and magnetism—not necessarily all, but two or more of them; in the grammar school add mechanics. The work to be entirely experimental, of a very simple character, cultivating the observing faculties; with books in the grammar school, if there were any of the right kind. The observing habit is the best basis for all work in science.

2. In high schools not less than a year should be given to the subject, the third or fourth year.

3. The high school work should be experimental, with the object of teaching the more simple laws of the subject, and the application of those laws; both inductive and deductive; both for information and discipline; with a text book, or both with and without would be a better answer; with laboratory work, decidedly. The ability to work with formulas containing radicals should be assumed. Apparatus should be for use, not show, and should be made of wood, iron, steel, and glass almost entirely; so a good profit could be left the dealer if the sets were sold at $100. Of course schools could work in lines where the apparatus would need to cost $200 or $300.

4. For admission to college there should be required a simple outline understanding of such a work as Gillet and Rolfe's Elements of Natural Philosophy.

5. The college work should be more advanced than this, suited to older pupils.

6. The course described above ought to prove the common ground.

7. In college, physics should come in the second or third year; plane trigonometry should be required of all but those beginning the study, but no higher mathematics. The study should be prescribed and laboratory work should accompany it for all students.

8. I have had no experience in college where a requirement of physics was needed for admission. All such work as I give under 1 and 3 has the effect of awakening thought upon useful subjects and leads to observing ways. No disadvantages have followed this requirement.

10. I think any professor of physics in college who cannot in lectures and laboratory work advance upon the instruction given in primary, grammar, and high schools so as to make his instruction interesting and useful in this advanced age in science ought to give place to one who can. He ought not to fear preliminary work, but ought to be thankful for all he can get; and the requirements for admission ought to be advanced as rapidly as possible on this subject, even if the requirements in Greek should be decreased thereby.

(7) *C. B. Cochran, State Normal School, West Chester, Pa.*

1. In the lower schools no study of physics is desirable; if studied at all, without books.

2. In high schools one year of daily work should be spent on physics, the last year.

3. The work should be inductive; for information and discipline, but the latter most prominent; with text book and laboratory work; arithmetic, algebra, and plane geometry should be assumed. The apparatus would cost from $750 to $1,000.

4. I think that physics should not be required to enter college on *either course*, but the college course should be thorough and accom-

panied with laboratory work, so that the student may acquire the spirit of scientific investigation.

7. In college, physics should be taken up in the junior year, after plane trigonometry; it should be a prescribed study, with laboratory work for all; analytical geometry and calculus should at least be recommended.

8. The requirement of physics for admission to college stimulates the schools to do work in this department, and thus promotes a more general knowledge of this subject. On the other hand, the attention of the preparatory student is divided among too many subjects at one time, and he is more apt to do slovenly work. I believe the [present] required studies are all that can be well mastered by the student, and any additions would mean an additional year to the preparatory course.

10. I think a college course in physics should be slow and thorough, and that assistant teachers should devote their time to directing the work of students in a physical laboratory. A high school course in physics should be for the benefit of those who cannot have the collegiate course and who are not encumbered with all the studies preparatory for college.

(8) *George L. Smith, Maryland State Normal School, Baltimore, Md.*

1. I think it desirable to introduce physics into the lower schools upon the general principle that the higher forms of education should differ from the more elementary in quantity only, and not in quality. Teach it by means of object lessons, dealing with the more common physical facts and omitting all theories. Use no books. This can and will serve as a basis for future work.

2. In high schools give not less than a year of daily work; but it would be better to introduce it into the work of each year for a portion of the year, and then not as daily lessons, but two or three per week, and thus avoid crowding the pupil.

3. The high school work should be inductive; for both information and discipline; with text book only as a book of reference, never to be memorized; and with as much laboratory work as possible, encouraging the pupils in constructing simple apparatus for themselves. Only such mathematical knowledge should be assumed as is furnished by the regular course of the school. The efficiency of apparatus does not depend so much upon the quantity as on the right use of it.

4. For admission to college there should be required about as much as is given in Gage's Elements of Physics or Ganot's Popular Natural Philosophy.

5. The college work should differ from that of the high school in quantity, and perhaps in paying a little more attention to the mathematics of physics.

6. I think a course can be planned that would satisfy the schools and

also the colleges requiring this study for admission. It should be that given above.

7. In college the work in physics should be prescribed and come in the first and second years. Plane trigonometry should be a prerequisite and the study of higher mathematics go on with that of physics. Laboratory work is necessary.

8. The large majority of children leave school after they have finished the primary or intermediate courses and engage in some trade or mercantile business in which a practical knowledge of physical laws would be of the greatest possible advantage. Why, then, should we not furnish them with such a knowledge in the elementary schools? Among the students that I have prepared for college I have always found that those who had this elementary training have stood highest in their classes, not in physics alone, but in all their studies. No disadvantages have followed the requirement of physics.

(9) *E. E. Smith, principal; G. H. Williams and Libbie Leary, assistants, State Colored Normal School, Fayetteville, N. C.*

1. It is desirable to introduce the rudiments or first principles of physics into grammar schools. We use Steele's Fourteen Weeks' Course in Physics in our department, and it seems to be well taken and understood by the pupils; it is better without books. We think this may serve as a basis for future work.

2. In high schools we think a year at least should be given to physics, as we deem it an almost essential branch. It should come in the fourth year.

3. The character of the work in high school should be thoroughness; it should be deductive; for information; with text book; without laboratory work. The student should have completed arithmetic and have a fair knowledge of algebra.

4. For admission to college (*a*) on a classical course there should be required a year's study, if thoroughness has been attained; (*b*) on a non-classical course, the rudiments, as more time could be devoted to the English studies.

6. We think the common ground may be found in this course.

7. Physics should come in the first year of the college course as an elective study, with trigonometry and laboratory work.

(10) *Marshall C. Wilson, State Normal School, Florence, Ala.*

1. Most assuredly I would introduce physics in the lower schools, teaching only the elements. I can best answer the question "To what extent?" by recommending Balfour Stewart's Physics in Appleton's Primer Series. Use text books, but the teacher ought to be independ-

ent of books for his phraseology. Certainly this can serve as a basis for future work, just as the study of the principles of Latin grammar would assist in mastering Latin.

2. In high schools 200 hours is ample time. The work should come in the last year.

3. In the high school, close attention should be paid to the principles, and at the same time construct as much apparatus as practicable. The work should be both inductive and deductive, for information and discipline, with book, and with laboratory work most assuredly. Assume a knowledge of the elements of geometry, and of trigonometry if possible. Two hundred and fifty dollars would be sufficient to purchase the apparatus needed, but every school needs a small amount each year for purchase of materials used. I think it is an admirable plan to have the students construct all the apparatus they can. Where they have access to founderies or machine shops they can make a great deal.

4. For admission to college (*a*) on a classical course the student should be prepared for examination on all subjects treated of in common school books on physics; (*b*) on a non-classical course he should have studied Deschanel's Physics or some text book of the same scope.

5. College students should pay more attention to laboratory work, and those prepared as suggested in 4 (*b*) should have much laboratory work, constructing apparatus and being encouraged to investigate new and old subjects.

6. I do not think a course can be planned satisfactory to both schools and colleges.

7. In college, physics should come in the first year; plane trigonometry should be required for all students but the beginners, and no higher mathematics. The study should be prescribed and accompanied with laboratory work.

8. I should think it most desirable to have students study physics before entering college. In my own case my time at college was limited to four years, and I had to *waste*, in acquiring the principles of physics, part of this time that I should have devoted to higher or mathematical physics, &c. I could have had this training without any detriment whatever to my classical training. I do not believe any disadvantages follow. I believe the student who devotes one hour each day to physics will take up his mathematical or classical studies with more zest than if he had no physics.

9. The reasons for the study of physics are above all for mental development; then for practical reasons; then for the aid rendered to colleges; and, lastly, because such work gives the student a self dependence not acquired in other work.

10. It is an important question how far neglect of sciences in the schools has proved detrimental. It is notorious that the physicians outside of large towns are completely ignorant of chemistry.

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(11) *U. Bettison, Peabody Normal Seminary, New Orleans, La.*

1. In primary or grammar schools the instruction in physics should be oral, a few simple experiments exhibited, the pupils encouraged to make others and to use their eyes in observing natural illustrations of the principles under discussion. This can serve as a basis for future work.

2. In high schools physics should come in the first year, and not less than 100 hours be given to it.

3. The high school work should be experiments by the pupils when possible, with the usual recitations; both inductive and deductive; for both information and discipline; with text book; with laboratory work. A knowledge of arithmetic and the use of the signs should be assumed. The apparatus may be "as costly as thy purse can buy."

4. For admission to college it is not advisable to require more than a general knowledge of leading principles.

5. Beginning with a general review the work should be the same for all.

6. Such a work as Avery's or Houston's, omitting light, heat, and electricity, would be likely to satisfy both the schools and colleges.

7. Physics should be a prescribed study and should come the first year in college. The parts requiring plane trigonometry may be used to illustrate the latter subject. No higher mathematics should be required. Laboratory work should accompany the instruction in physics.

8. I have had no experience in the requirement of physics for admission to college.

9. Pupils should acquire the habit of accounting for every phenomenon by natural causes. It saves them from superstition, increases their stock of good common sense, and teaches them that God's government is that of law and not of caprice.

(12) *Eben S. Stearns, State Normal College, University of Nashville, Nashville, Tenn.*

1. In lower schools teach with simplicity and *exactness* the elements of natural philosophy and chemistry, with special application to "things familiar." Without books in the primary and in the earliest years of the grammar school. If properly taught this can serve as a basis for future work.

2. If the high school pupils are to enter at once upon their life business I would, if possible, give them the full 200 hours in physics; circumstances should decide when it should come.

3. The work of the high school should be the study of language (including literature), mathematics, geography, history, and natural science; both inductive and deductive; for both information and discipline; both with and without text book; with laboratory work if possible. The apparatus should be the simplest, the easiest to use, and the least costly.

Pupils should be early taught that for most purposes of illustration expensive and showy apparatus is unnecessary. They should be taught how and encouraged to make for themselves such as they may need in ordinary cases.

4. For admission to college, enough physics should be required to afford a general idea of all the principal divisions, but with such exactness and thoroughness as to form a *reliable basis* for future study if pursued.

6. The course described in answer to 3 and 4 will probably satisfy the schools and colleges.

7. Physics should be a prescribed study; circumstances must determine when the student should take it up. Laboratory work should accompany the whole course, if possible.

8. The peculiar character of this institution renders it impossible to answer this and some other questions in such a way as to make the replies of much value.

9. In a majority of cases the preparatory schools will be the only place where pupils can have such instruction; in all other cases these schools afford the best and most natural opportunity for laying a foundation for future study.

10. Among the early studies I would be sure to introduce something of agricultural chemistry, and that of air, water, and food; also, something of zoölogy.

(13) *R. H. Holbrook, National Normal University, Lebanon, Ohio.*

1. I think it is desirable to introduce physics in lower schools; the study to include such facts only as concern common things: how a clock runs, watch, draughts in a stove and in a room, ventilation, working of suction pump, simple vacuum experiments, &c. Teach with books if possible, without if necessary. Certainly this can serve as a basis for future work.

2. In the high school about one-third of the time should be given to natural science and about one-sixth of that to physics. It should come in the third year and precede chemistry.

3. The high school work should be investigation with text book, with a few experiments by the teacher, then a review of the whole subjects by experiments and lectured upon by the pupils; both inductive and deductive (it seems so axiomatic that every step in learning is both inductive and deductive that I am impatient at these terms); for both information and discipline; with text book *of course;* certainly with laboratory work, but rather in most cases with apparatus constructed by the pupil himself. A knowledge of geometry and trigonometry should be assumed. With few exceptions the apparatus would be that which costs practically nothing. There is *enough* to do with ordinary shop, kitchen, and grocery materials.

4. I do not know how much physics should be required for admission to college.

7. It should be taken in the third year of a college course. For students named in 5 plane trigonometry should be a prerequisite, and of higher mathematics calculus and mechanics. Laboratory work is necessary for all classes named in 5.

8. Never having taught physics in a college I cannot say how the requirement of it for admission proves advantageous. Our work here is necessarily illustrative and that applicable to common life.

9. Physics is an observational science and should have its constant recognition in a curriculum along with the other natural sciences, all of which should constitute about one-third of the curriculum from primary to collegiate studies.

10. The great need is that common school teachers be taught to illustrate all the important principles in physics with kitchen and grocery materials.

(14) *John A. Steele, Central Normal College, Danville, Ind.*

1. At least all the fundamental principles of physics, embracing the properties of matter, with experiments in heat, sound, electricity, &c., might be introduced into the higher grades of lower schools; without books, unless for general reference. This may serve as the best possible basis for future work.

2. One-half hour each day should be given to physics in high schools, and pupils ought to think and investigate outside of school hours. It should be studied in the third or fourth year.

3. To create an enthusiastic love for honest industry and investigation, should be the character of the high school work; both inductive and deductive, the former taking the lead; for information and discipline; with laboratory work. *Do not teach* text books: use them as dictionaries; teach subjects: use books as aids. Mathematics ought to accompany physics, but, to begin with, very little mathematical knowledge should be assumed. Pupils ought to construct nearly all apparatus. Expensiveness implies complexity and mystification.

5. The instruction in college should embrace a review, with a more minute examination, and a continuation of what preceded.

6. The course described in 3 would be likely to satisfy both the schools and the colleges that require physics for admission.

7. Physics should accompany or follow geometry. No higher mathematics than trigonometry should be a prerequisite. All students named in 5 should have laboratory work.

8. (1) Our students are assigned topics, not pages, and by turns are expected to explain and illustrate by experiment, if practicable, all that pertains to those topics. Teachers anticipate and provide for difficulties, each recitation looking to the following and to the preceding

one. (2) We receive all grades, provide suitable classes, and hold no preliminary examinations.

(15) *Daniel B. Parkinson, Southern Illinois Normal University, Carbondale, Ill.*

1. It is desirable to introduce in primary or grammar schools the study of physics to a limited extent and of an elementary character. The instruction to be on the properties of matter, the elementary principles of mechanics, pneumatics, acoustics, optics, magnetism, frictional electricity and force. Teach without books. This can serve as a basis for future work, as far as it goes.

2. Physics should come in the second or third year of a high school course, and with the preparation made in the lower grade less than the entire year is sufficient.

3. The character of the high school work should be a thorough knowledge of the principles and laws of the subjects; inductive; for information and discipline; with text book; with laboratory work, if possible; a knowledge of algebra and geometry sufficient to enter college should be assumed. In the main the apparatus can be very inexpensive and prepared largely by the pupils. In addition to what can be made by the learner, an outfit amounting to $200 or $300 could be used to great advantage.

4. The work as indicated for the high school and the academy should be required for admission to college on both courses.

5. Students who begin this work in college should have an additional term in the elements. For others the work should be more exhaustive and more of detail than before.

6. The course described in 3 might satisfy both the schools and the colleges that require physics for admission.

7. Elementary physics should be a prescribed study and come in the junior year. Neither plane trigonometry nor any higher mathematics should be required. Laboratory work is necessary.

8. My experience has been confined to a seminary and a normal school. I value very highly the method of improvising simple and cheap apparatus as far as they will answer. I am also in favor of a physical laboratory and much emphasis being placed upon personal investigation and experimentation on the part of each pupil. It is more valuable than all things else in the study of physics. An actual verification of a statement is more satisfactory and profitable than many times as much theoretical knowledge. The former teaches close observation and individuality. I see no reasons why there should be any disadvantage in the requirement.

9. Physics teaches the young pupil to become interested in what he sees about him and arouses a spirit of inquiry and investigation.

10. I take pleasure in emphasizing the importance of a physical laboratory. It is needed quite as much as a chemical laboratory. I believe there

will soon follow a new departure in teaching this important branch, and the most radical change will consist in giving an opportunity for *individual* work on the part of the pupil. The learned and brilliant lecture system is entertaining, but I believe the best results will come from the method given before. The study of physics in this regard can be less expensive than it is possible to make the study of chemistry. The apparatus is much less delicate and can be made by the inexperienced.

(16) *D. S. Wright, Iowa State Normal School, Cedar Falls, Iowa.*

1. I do not think it desirable to introduce formal instruction in physics in the lower schools. The instruction should be merely incidental, oral, and without books. This cannot serve as a basis for future work.

2. Two terms of the last year is ample time to devote to physics in a high school course.

3. The work in the high school should be elementary, largely by means of experiments; inductive; for information and discipline; with text book; and laboratory work. A knowledge of arithmetic completed should be assumed. The apparatus would cost $50.

4. A knowledge of some standard elementary work on physics should be required for admission to college.

5. The course in college should be the same for all. The text book should present a more advanced course and the laboratory work should be fuller.

6. The course described in 3 and 4 might satisfy the schools and colleges.

7. Elementary physics should be taken in the first or second year in college as a prescribed study, accompanied by laboratory work. For all students named in 5 plane trigonometry should be a prerequisite, but no higher mathematics.

8. Taking things as we have found them the benefits derived from the requirement of physics for admission to college are not very apparent; but, if the uniformity referred to in the circular could be secured, the attainments of the preparatory school would be the starting point for the college work. As to the disadvantages, none have followed.

9. The study of physics in the preparatory schools gives information to those who cannot take a higher course of instruction and relieves the college of the more elementary part of the work.

(17) *Charles H. Allen, State Normal School, San José, Cal.*

1. It is desirable to teach in primary or grammar schools the general laws of mechanics, atmospheric pressure, and, in short, the main facts of physics with which an ordinarily well informed person should be acquainted in after life; without books; instruction should be given experimentally with simple illustrations entirely within the comprehension of the pupil. If fairly well done this can serve as a basis for future work.

2. Physics should be taken the third year in the high school, if most of the pupils stay through the course; otherwise it should be taken earlier. About 100 hours will do.

3. As far as possible the instruction in the high school should be by illustrative experiments; with books; for information; with laboratory work, if simple. A knowledge of applied algebra and all of arithmetic should be assumed. The cost of the apparatus would be very light; $100 would do the whole, if well expended.

5. Students who begin the study in college should have greater mathematical knowledge, and more of an effort should be made at discipline.

6. The course described in answer to 3 would satisfy the schools and colleges as far as it goes.

8. The main part of what is given in answer to 1 I have done with marked success. Pupils are made observant and thoughtful and do not go through the world blind. They will constantly add to their knowledge, and, if they go on in the course, have acquired a taste for and power in these subjects.

10. My answer to question 1 is based mainly on this fact: only 5 per cent. of the pupils in this State go to any school more advanced than the grammar school, and the *information* is valuable.

II. FROM TEACHERS IN SECONDARY SCHOOLS.

(18) *William Harper, A. M., High School, Farmington, Me. (formerly with State Normal School).*

1. By all means introduce (though not, to any great extent, as a science) the study of physics in lower schools. A large number of the simpler phenomena and principles might be taught, such as gravity, inertia, resistance of the air, properties of air and water, expansion and changes of state by heat, reflection and refraction of light, the spectrum, properties of magnets, &c. With books, if suitable ones can be found; otherwise without. The child should not be prejudiced against the subject by an unsuitable book. This can most assuredly serve as a basis for future work.

2. In the high school a year should be given to physics by those who will not attend a school of higher grade; for others less might answer. It should come in the second year.

3. The instruction in the high school should aim to give clear views of the most important principles in all departments of the study and should open the student's way to further study; inductive and deductive; for information and for discipline; with text book; with laboratory work. A moderate knowledge of plane and solid geometry and of elementary algebra should be assumed. The cost of the apparatus need not much exceed $100. (See list of prices in Mayer's Sound.)

4. If classical and non-classical students are to work in the same classes in college they should have essentially the same preparation.

It should be of the character described in answer to 3 and should occupy not less than two-thirds of a school year, aside from what may have been learned in the primary or grammar school. It should of course not repeat the work of the preparatory course.

5. For students who begin physics in college the instruction may be more largely deductive than in the high school; for others it may be still more so. In other respects there should be no essential difference.

6. The course described in the answers to 3 and 4 would be likely to satisfy the schools and colleges.

7. Physics should be taken as a prescribed study in college. Let it come in the second year. Plane trigonometry should be a prerequisite for all students named in 5; no higher mathematics should be required till the whole matter is on a better footing than now. Laboratory work should accompany the other work to some extent for all.

8. I cannot speak from experience as to the effects of requirement of physics for admission to college. As to question 1, I have recently been asked to prepare a series of articles on physics for a child's paper and find it quite practicable to present important principles so as to be comprehensible and interesting to children of seven or eight years of age. All my answers to 3 are derived from quite a number of years' experience as teacher and from my experience as a learner.

9. Reasons for the study of physics in the preparatory schools are its very high value for practical life and for mental discipline and its *necessity* for understanding other sciences; its aims are to enlist the pupil's interest, give him a good foundation for future work and for practical application.

10. For admission to college a knowledge of experimental illustrations should be required, and not merely a knowledge of statements which may be memorized from a text book; otherwise it will be necessary to go over the whole ground again in college, and the preparatory course, by giving a training in wrong methods, will be of very questionable value.

(19) *J. Milnor Coit, M. A., Ph. D., St. Paul's School, Concord, N. H.*

1. It is not desirable to introduce the study of physics in lower schools.

2. Physics should come in next to the last year of a high school course, and for elementary work five hours per week for forty weeks is sufficient.

3. The instructor should assign regular lessons and illustrate them by lectures and experiments; inductive and deductive; for information and discipline; with text book; with as much laboratory work as can be done with aid of instructor. A thorough knowledge of arithmetic, algebra through simple equations, and the elements of plane geometry should be assumed. The cost of the apparatus would, of course, depend upon the ability of the school to provide it. An apparatus for

elementary instruction can be provided for about $400 or $500 which would be sufficient.

4. Six months' study of physics should be required for admission to college on a classical course, and a year's or even two years' study, if possible, on a non-classical course.

5. The instruction of students who begin physics in college should be by text book, lectures, experiments, and recitations; of those who have the preparation suggested under 4 (*a*), lectures, text book, and experiments; and, of those who have the preparation suggested under 4 (*b*), laboratory practice in addition to the above.

6. The course described in answer to 3 and 4 would be likely to satisfy the schools and colleges.

7. The student should take up physics in the first and second years as a prescribed study. Plane trigonometry should be a prerequisite for classes 5 (*b*) and 5 (*c*). I think laboratory work should not accompany the other work.

8. The requirement of physics for admission to college has proved advantageous by making students familiar with the elementary principles, so that they can more easily understand the more advanced text books used in college and appreciate the lectures, besides giving the mind the necessary training in the power of observation and making deductions therefrom.

(20) *Marshall R. Gaines, Kimball Union Academy, Meriden, N. H.*

1. Physics might be introduced in lower schools—at any rate, in the ungraded country schools. Instruct the pupils until they are perfectly familiar with some elementary work on the subject, and try simple experiments illustrating the more common principles; with books and oral teaching combined. This can serve as a basis for future work.

2. Probably a year, the second of the high school course, would prove none too long for the study. It should precede physical geography, astronomy, &c.

3. The instruction should be principally inductive; for information and discipline, but primarily for the former; with text book; with laboratory work to some extent. Assume a knowledge of geometry. For this class of students it would be the highest practicable branch attainable.

4. For admission to the academical or literary course in college no physics should be required; for admission to a technical school one full year might be advantageous.

5. For students named in 5 (*a*) and 5 (*b*) the instruction should be fuller, with a more advanced book and more experiments; for those named in 5 (*c*) it should be still more advanced.

6. The course named in answer to 3 and 4 seems practicable as the common ground for schools and colleges.

7. Physics should be a prescribed study and come in the junior year. Students named in 5 (e) should take laboratory work unless they have already had it. Plane trigonometry should be a prerequisite, but no higher mathematics unless for students named in 5 (e).

8. As a boy I was greatly helped by a simple work on physics, studied when a pupil of primary grade. High schools should have an English and a classical course: in the former, physics should be thoroughly taught, while members of the latter going to college should depend upon getting their physics there.

I do not think any serious disadvantages could follow the requirement of physics for admission to college, if students were willing to wait long enough to learn such things before going to college. To secure this we need more time. I have had no experience in the matter to guide me. Our New England colleges, as a general thing, do not require it.

9. Those who cannot go to college obviously need to study physics while in school, not only for the practical needs in common life, but to develop the reasoning and the perceptive faculties.

(21) *H. Q. Ward, McCollom Institute, Mt. Vernon, N. H.*

1. It is not desirable to introduce physics in primary or grammar schools.

2. In the high school course it should come the third year. I do not think it would give other branches a proper chance to give it a year; two-thirds of a year is sufficient.

3. The work should be for discipline; with text book; with laboratory work. A thorough knowledge of arithmetic, the rudiments of algebra, and geometry should be assumed.

4. For admission to college on a classical course, no physics should be required; on a non-classical, two-thirds of a year should have been given to it.

7. Physics should be a prescribed study and taken the third year.

(22) *Rev. M. L. Severance, A. M., Burr and Burton Seminary, Manchester, Vt.*

1. A small work on physics might be used in lower schools: something very simple and calculated to stimulate the pupil, not discourage him. If physics is taught at all I would have a book. This ought to serve as a basis for future work.

2. We usually crowd it into one or two terms, but the knowledge obtained is very meagre. It ought to come when the mind is quite mature. Electricity, heat, &c., are abstruse subjects.

3. If students are going to college, the college should do the main work; if not, the academy should do what it can. The work should be deductive for young pupils; for information and for discipline; with text book; with laboratory work. Physics ought not to come before consid-

erable knowledge in mathematics has been acquired. An academy that does anything in the natural sciences ought to have $1,000 in apparatus.

4. The work now done in college ought to be done in the preparatory course. College graduates, as a rule, know but little of the natural sciences.

5. The work in college ought to be practical as well as theoretical.

7. Students should not take up physics earlier than the junior year.

8. Physics has not usually been urged on students in the preparatory course for college; but when they come into college without previous study they rarely get more than an elementary knowledge of the science, rarely more than our classes in the academy get. But few get a love for physics who do not take up the subject until they find it in the college course.

9. The study in an elementary way is good for those who do not intend to pursue their education to advanced scholarship, as suggesting and laying open to their minds an interesting field of knowledge. It opens an inviting door, and it enables the college student to go deeper into the subject and make himself more efficient for whatever work he may have thrust on him. The natural sciences broaden the base of a preacher's knowledge and better fit him for that work. If he makes teaching a profession, physics ought to be among his qualifications.

(23) *A. M. Marsh, Minard Commercial School and Green Mountain Seminary, Waterbury Centre, Vt.*

1. Introduce into lower schools "talks" on the philosophy of common things, using what is at hand for illustration. Instruct by first interesting, without books. This will at least aid future work.

2. As most high school courses are arranged, not more than one term of ten or twelve weeks can be given to physics. Let it come the third year.

3. The work should be simple and practical, not attempting too much; mainly inductive; for information as well as for discipline; with text book; with laboratory work. A knowledge of arithmetic, elementary algebra, and plane geometry should be assumed. The cost of the apparatus would depend greatly upon the ingenuity of the teacher. One hundred dollars well expended might do; more, of course, would be better.

4. A thorough knowledge of some good elementary work on physics should be required for admission to college on a classical course, and the same on a non-classical course. More would be better, but in most fitting schools it is impossible to give more time to it.

5. For students named in 5 (*a*) the instruction in college should be the same as in answer to 3; for those named in 5 (*b*) and 5 (*c*) it should be higher and broader.

6. I think the course named in answer to 3 and 4 would be likely to satisfy both schools and colleges that require this study.

7. Physics should be taken in the third year. For students named in 5 (*b*) and 5 (*c*) plane trigonometry should be a prerequisite, and it would be well to require higher mathematics. Students named in 5 (*a*) should take laboratory work. Elementary physics should not come in a college course.

8. With young children I find a talk on the simplest physical laws is always interesting. It also trains them to think upon what they see. I would have physics taught in high schools for the same reason that I would have grammar or book-keeping: it is needed. I am not acquainted with any fitting school where physics is a required study. It should be.

I know of no disadvantages but what would apply to any study in the course: too many studies cause crowding and cramming.

9. By beginning the study in the primary school more can be done in the preparatory; by teaching the elements in a preparatory school more can be done in college.

10. It seems to me that all must be agreed on the importance of the study of philosophy in schools of all grades. If colleges would require it as one of the fitting studies, all fitting schools would necessarily teach it.

(24) *William B. Graves, Phillips Academy, Andover, Mass.*

1. Physics might be introduced to a limited extent in lower schools. The instruction should be a general exercise given by the teacher on such laws as can be illustrated by the common facts within the observation of children; without books. By training the perception this can serve as a basis for future work.

2. In high schools two terms of the third year should be given to it; in our best academies the full year.

3. The work should be largely descriptive, but to some extent mathematical; both inductive and deductive; for both information and discipline; with text book; with laboratory work, if possible. A knowledge of arithmetic, algebra, and, when practicable, trigonometry should be assumed. For the apparatus, exhaust the resources of the school, and then more will be needed. It should be well made and selected with judgment. The lists advertised by Ritchie, of Boston, are good for limited resources. From $100 to $2,000 could be used, according to the school and the competency of the teacher.

4. As much as is contained in Stewart's, Avery's, or most of the elementary books should be required for admission to college on a classical course, and about the same on a non-classical course. Although studied in the technical schools, some preliminary knowledge is of great advantage to the student.

5. The instruction in college should be more mathematical for all, with original work for students named in 4 (*a*) and 4 (*b*).

6. The course described in answer to 3 and 4 is the common ground sought.

7. Physics should be a prescribed study, taken in some colleges the first year, in others the third year. The classes (*b*) and (*c*) in 5 should have laboratory work. Plane trigonometry should be a prerequisite, and higher mathematics for extended work.

8. I find Todhunter's Natural Philosophy, in two parts, with Thompson's Electricity and Magnetism, a good course for candidates for scientific schools. Mathematical examples are a great help. Preparatory work in physics enables the student to take the advanced course in college and prepares him to appreciate the greater facilities for the study that are found in our best colleges.

Text books are sometimes used which give erroneous ideas, and the student is obliged to learn his philosophy over again. When the work is well done, I know of no disadvantages following the study.

9. Physics should be studied in the preparatory schools, to create a love for the study, to train the perceptions to observe closely physical facts, and as a preparation for practical life.

10. We must have trained teachers. Books, apparatus, &c., are vastly more abundant than the men and women capable of using them for intelligent instruction. As a rule, however, the instruction given in our best New England academies is quite as good as in our colleges. Those methods which rest on the higher mathematics are of course excluded in the secondary schools; indeed, in college they are only pursued by the select few who elect the higher mathematics. Much good may come out of the efforts made to secure physical laboratories. But the doctrine that physics is best taught without a text book is fallacious, true only with regard to children in the grammar school. A course of study which compels the student to prepare his work for a daily examination, accompanied with illustrative experiments with a well appointed apparatus, seems to me to be the best method of teaching physics in academy or college.

(25) *Charles D. Adams, Cushing Academy, Ashburnham, Mass.*

1. Physics might be introduced in lower schools to a very moderate extent, entirely experimental, just enough to bring out the simpler facts, especially in mechanics, heat, light, and electricity, without books, unless they are of a very popular kind. This can serve as a basis for future work.

2. In the high school give physics a year if laboratory work by the student is possible, but only half a year if experiments are performed by the teacher. It should come in the third year.

3. The work should be experimental and practical, with a constant application of principles to common life; inductive; for discipline first;

with text book; with laboratory work. A knowledge of algebra and plane geometry should be assumed.

4. For admission to college on a classical course an elementary course in physics should be required; on a non-classical course, theoretically more of the theoretical part than in the classical, practically most schools must educate both classes of students together.

5. The instruction in college should be more mathematical and theoretical for students named in 5 (*a*), and still more so for those named in 5 (*b*) and 5 (*c*).

6. The courses described above will probably satisfy both schools and colleges.

7. Physics should be a prescribed study of the third year in college. There should be an opportunity for laboratory work for any who had not taken it. For non-classical students plane trigonometry should be a prerequisite, and possibly some higher mathematics.

8. My experience shows the great value of inductive work by way of discipline. I find a great lack in all our text books in that they prefer impossible problems to practical applications of the principles.

9. Scholars should be taught to observe; hence the work in grammar schools. The aim is to enable the pupil to study for himself all his life; hence he himself must observe and make his own inductions.

10. The college cannot require an *experimental* course in physics as a preparation, but should give and *require* thorough laboratory work on the part of every student.

(26) *Merton S. Keith, G. W. C. Noble's Classical School, Boston, Mass.*

1. It is desirable to introduce physics in grammar schools, the instruction to be on properties of matter, gravitation and falling bodies, the simple machines, the general principles of liquids, pneumatics, electricity, magnetism, sound, heat, and light; with books, accompanied by experiments. This can serve as a basis for future work.

2. In high schools, if only the most general principles are taught and illustrated, 100 hours will be enough, provided extra time be allowed for experiments by the pupils at home. It should come in the later years of the course.

3. The work should be for information and discipline; with laboratory work; with text book. Where it is possible let experiments precede book study. A knowledge of arithmetic through evolution and proportion and some algebra should be assumed. Two hundred dollars would equip a laboratory for an ordinary school. Scholars can be told how to furnish themselves with simple apparatus for home experiment.

4. On a classical course there should be required for admission to college a thorough drill on dynamics, with examples, simple machines, liquids, and pneumatics, but only in a very general way the other branches of physics; on a non-classical course, all the branches with as much *fulness* as is found in Arnott's Physics, but more mathematical work.

5. Students who begin physics in college should devote more time to the study and take laboratory work. For students named in 4 (*a*) the instruction should consist of reviews and more thorough work in sound, light, heat, &c.

6. It is likely that the courses described in answer to 3 and 4 will satisfy the schools and colleges.

7. Physics should come the first year in college; all subjects should be required and some electives furnished. For students named in 5 (*b*) plane trigonometry should be a prerequisite, but no higher mathematics, unless electives are allowed for those who intend to become specialists. All students should take laboratory work.

8. In preparing boys for college, we often find some pupils who show a greater aptitude for physics than for other studies; if we give them a taste of the leading facts and principles in college, they can pursue the whole subject more minutely and perhaps become specialists. Under the present classical system, the pressure for time in the school room, owing to Greek, Latin, French, &c., leaves us too little time for experiment. If we get time to explain rather theoretically the leading laws and phenomena of nature, we think we do all that the colleges will require.

9. Children should be trained to learn by using their own faculties as fully as possible and coming in contact as closely as possible with nature. They should be made to see that truth does not depend on the simple authority of some author. They should catch the spirit of inquiry and learn *how* to observe, compare, and draw conclusions of *themselves.*

(27) *E. P. Jackson, Public Latin School, Boston, Mass.*

1. The study of physics in the lower schools should be about the most common phenomena, such as atmospheric pressure, solids, liquids, gases, &c., without books; this can serve as a basis for future work.

2. Three hours a week of the third year should be given to physics in the high school.

3. The work should be experimental; deductive; for information and discipline; with text book; with laboratory work. A knowledge of the metric system, a little geometry, and enough algebra to transpose equations and reduce should be assumed.

4. For admission to college on a classical course a complete course of elementary physics should be required; on a non-classical, the subjects of light, electricity, magnetism, and kinetic energy should be omitted.

5. The instruction for students named in 5 (*a*) and 5 (*b*) should be more theoretical and more mathematical; for those who entered on non-classical course it should include the subjects not required for admission to college.

6. The course described above should satisfy both schools and colleges.

7. Physics should be a prescribed study of the junior year. Laboratory work is necessary for students named in 5 (*a*). Plane trigonometry should be a prerequisite for students named in 5 (*c*), but no higher mathematics.

8. I find that those who have been led to *think early*, think more sensibly or rationally than others. "Experiments" are intensely interesting to young students. The elder are more able and ready to generalize and theorize. The requirement has furnished a partial corrective and relief to the memorizing drudgery of the classical preparation. No disadvantages have followed.

9. Physics should be studied in the preparatory schools, because observation of natural phenomena and thinking on them should begin early; experiment early because it is fascinating to the young—a relief to committing Latin grammar to memory.

10. College text books should not be "elementary" in the non-classical course.

The above answers have received the general indorsement of Moses Merrill, head master of the school.

(28) *H. H. Gay, Bridgewater High School, Bridgewater, Mass.*

1. I think lower schools have enough to do without physics, and the powers of observation can be better trained on objects in mineralogy and zoölogy.

2. In the high school at least one year's study (200 hours) should be given to physics; more would be better. It should come not later than the second year, because some drop out each year.

3. The high school work should be experimental: (1) experiment, (2) observation, (3) inference, (4) application); inductive; for both information and discipline; both with and without text book; never without laboratory work. A knowledge of arithmetic should be assumed and some algebra and geometry would be desirable. At least one hundred and fifty dollars' worth of apparatus would be needed, but more is desirable. The apparatus should be simple and there should be sets enough so that each pupil can experiment.

4. Instruction in the fundamental facts and principles of matter, dynamics of fluids, heat, light, &c., should be required for admission to college on the classical course, and the same on the non-classical, but more complete.

5. The instruction in college should not differ at all in method from that of the high school, but should be more thorough.

8. Pupils show much greater interest in the study when they can experiment and they learn *real* things and not another's statement of his discovery. The text book deductive method is a wrong to the pupils. The experimental method gives them a good idea of the scientific method.

(29) *William F. Bradbury, Cambridge High School, Cambridge, Mass.*

1. A very little physics might be introduced in lower schools, only of the most elementary character and *oral;* without books. This can serve *very* slightly as a basis for future work.

2. One year (200 hours) should be given to physics in the high school. It should come at the end of the second and beginning of the third year.

3. The work should be inductive and deductive; for information and for discipline; with text book; with laboratory work, if possible. A knowledge of arithmetic, elementary algebra, and plane geometry should be assumed. Simple apparatus is often as effective as more expensive, if made and handled by an ingenious teacher; but the more apparatus you can afford the better; only keep it within the subjects taught and the comprehension of the pupil. We have some four thousand dollars' worth.

4. As a preparation for college in the classical course we give about 120 hours. If we had time I would add 80 hours more. We do not fit for a non-classical course, but I should say 200 hours.

5. For students who begin the work in college the instruction should be the same as in the high school; perhaps, as they are older, a larger and more mathematical text book. Others should be given a more difficult and larger book and have trigonometry and perhaps conic sections.

6. I think the course described in answer to 3 should satisfy the schools and colleges.

7. Physics should be a prescribed study, taken the second year or the first part of the third, and accompanied by laboratory work. Plane trigonometry should be required from all and conic sections, as above.

8. A little work in lower schools may awaken an interest and excite a desire to know more, and thus induce one to go forward. Without study of physics before entering upon a college course the student is likely to be swamped in college, and if he leaves school before college he goes out lamentably ignorant of what everybody ought to know.

I have seen no disadvantages follow the requirement of physics.

10. I am inclined to think that college professors assume an amount of knowledge and an ability on the part of college students which unfortunately do not exist.

(30) *Mrs. A. P. Potter, Home School for Young Ladies, Everett, Mass.*

My school being a preparatory one, and also embracing a regular course, I can hardly answer the questions you have given. I will say that I consider it important for the primary pupils to have oral instruction in physics and for the pupils in the regular and preparatory courses to carry on one scientific study each year.

(31) *L. B. Treharne, St. Mark's School, Southborough, Mass.*

1. It is not desirable to introduce physics in lower schools.

2. High school pupils should have daily work in physics during the fourth year.

3. The work should be such as to awaken an interest in the subject; inductive and deductive; for information and for discipline; with text book; with laboratory work. A knowledge of arithmetic, algebra through quadratic equations, and plane geometry should be assumed. The apparatus would cost $300.

4. For admission to college on a classical course I would make the study of physics optional. If a student takes it up let him pursue the same course as in the technical department. On a non-classical course a year's work of daily recitation is sufficient.

5. Let there be but one course of instruction in college; those who begin it in college must suffer from a lack of previous training.

6. The course described in answer to 3 and 4 will be likely to satisfy the schools and colleges.

7. In college, physics should be taken in the sophomore, junior, and senior years. Laboratory work should accompany the other work. Plane trigonometry should be a prerequisite; general geometry and calculus may be in the course with physics.

8. The results obtained in my experience that bear upon questions 1, 3, and 4 are as follows: (1) I find boys do not gain anything by starting the subject when too young. (3) The high school work is very satisfactory. (4) Sufficient to pass the examinations. The requirement for admission, as in mathematics, has enabled the professors in college to take a class further on in the subject, inasmuch as no time is lost in elementary work, a hasty review of which I deem sufficient.

I know of no disadvantages.

9. There is so much practical useful knowledge to be derived from the study of physics that if a college does its work thoroughly it should form one of its most important branches. I would then consider the aim to be as in learning a trade: to accomplish an end which would form a foundation on which to build.

(32) *F. B. Stevens, Commercial and Collegiate Institute, New Haven, Conn.*

1. It is not desirable to introduce physics in lower schools.

2. In the high school certainly as much as a year of daily work should be given it in the latter part of the course.

3. The work should be the reading of a descriptive (popular) book, with suitable explanations, and, if possible, the study of familiar compound machines, steam engine, pump, &c.; more particularly for discipline; with text book; with the simplest kind of laboratory work; very little mathematical knowledge should be assumed, but the more, of course, the better.

4. For admission to college the student should have read such a descriptive book as Arnott's Elements of Physics.

5. Students should have a familiarity with terms and general results before entering. The prescribed course should cover about the ground of Atkinson's Ganot's Physics.

6. The course described above will satisfy the schools and colleges.

7. In college, physics should be a prescribed study of the third year. Plane trigonometry should be a prerequisite, and higher mathematics for non-classical students. Laboratory work should be taken by all.

8. The men who enter Harvard, for instance, are able to read more understandingly the prescribed work outside of the classics; and to one who intends to make his profession that of a teacher, physician, physicist, mathematician, &c., an early acquaintance with the terminology of physics is most valuable.

9. The preparatory course should and can only be descriptive, and a general knowledge of the bearing of scientific investigation should be instilled in every young man before graduation from school.

(33) *William Hutchison, Norwich Free Academy, Norwich, Conn.*

1. It is desirable to introduce in lower schools very simple experiments on the general principles of physics; without books. This can serve as a basis for future work.

2. In the third year of the high school, one hour a day four days in the week should be given to physics.

3. The work should be experimental, with frequent examinations or quizzes; inductive; for information and for discipline; both with and without a text book; with laboratory work. A knowledge of plane geometry and trigonometry should be assumed. The cost of the apparatus depends entirely on the means; simple and inexpensive apparatus will answer.

4. The amount of physics required for admission to college on a classical course depends on the plan of the subsequent course; on a non-classical course, more than on the other course, though everything depends on where the course begins and how it proceeds.

5. (*a*) In college, the work should be of the same kind as described under 3, only more extensive; (*b*) more elaborate; (*c*) more full and exhaustive.

6. A course can be planned to satisfy the schools and colleges. The college must take the lead and the school follow.

7. The year physics is taken in college depends on the rest of the course. All students should study physics with laboratory work. Plane trigonometry should be a prerequisite, as one cannot advance far without it. Higher mathematics should be required for the advanced study.

8. I do not think the requirement of physics for admission to college has been thoroughly tried anywhere. The preparatory study has

been crammed, and there has been no proper understanding on the subject between the preparatory schools and the colleges. The study in the college has not been properly conducted. Study and experiment should go hand in hand from beginning to end.

(34) *M. H. Smith, Connecticut Literary Institution, Suffield, Conn.*

1. It is desirable to introduce in lower schools some study of physics, to be confined strictly to the rudiments, so that there may be a successive development up to the technical school; without books, if the teacher can. This ought to serve as a basis for future work; if not, it is worthless.

2. Those who go to college need to spend less time on physics in the high school than those who do not go. For the latter 200 hours is little enough. It should come the third year.

3. The work should be intermediate between that of the grammar school and the college; inductive and deductive; for information and for discipline; both with and without text book; with laboratory work. A knowledge of arithmetic, algebra, and, if possible, geometry should be assumed. A skilful teacher can illustrate most of the principles of physics with an inexpensive apparatus.

4. Enough physics to enable the pupil to comprehend the college instruction should be required for admission, and it should be as much a condition of graduation as the languages.

5. The college instruction should be more extensive. Students should begin the work before entering college. I would not make the distinction (*a*) and (*b*).

6. I think the course described above is the common ground for schools and colleges.

7. The student should take up physics in the second or third year, and it should not be elementary. It should be accompanied by laboratory work. In college instruction physics should always require "applied mathematics," and if necessary higher mathematics.

8. Most of the colleges with which I am acquainted have practically not required physics; and those that do so are not exacting enough so that a fair opinion can be given.

9. Physics in the preparatory schools teaches observation and stimulates experiment.

10. To sum up: Physics should be taught in the intermediate and grammar schools for the reasons given in the answer to 9. It should be taught practically in the academy and high school, and as a large majority of the pupils do not go to college, they have the greatest need for a practical knowledge of physics, especially mechanics. It should be taught more scientifically and theoretically in the college.

(35) *J. Henry White, Woodstock Academy, Woodstock, Conn.*

1. In the study of physics in lower schools pursue object teaching as *time allows;* perhaps ten to sixty minutes per day. Aim at the prin-

ciples by familiarity, going quite slowly, with very many experiments and without books. This can serve as a basis for future work.

2. One year in right and accurate channels is enough time to devote to physics in the high school. Let it come the first year.

3. The work should be experimental, logical, and theoretical; inductive; for information and for discipline; both with and without text book; with laboratory work. A knowledge of arithmetic should be assumed. Make, with very few exceptions, your own apparatus.

4. For admission to college on a classical course require all the physics possible, so as to give more time for literature of a higher order than is found in high school or academy. On a non-classical not so much should be required. I do not believe in a non-classical course except for reprobates.

6. There is not much hope that a course can be planned to satisfy all the schools and colleges.

7. Physics should be an elective study. It is taken up the third year. Plane trigonometry should be a prerequisite.

8. Physics is and should be an elementary study, inductive throughout, so that the scholar may think and reason out the unknown from the known. This is profitable in thousands of ways.

10. I am a learner of twenty years, yet I should be pleased to communicate any pertinent thought did time allow. A good deal of poor teaching has been and is given on this simplest and most profound study of physics. But, as a college course proper is non-professional, I think it best to spend those four years in the broad field outside of the science of the high school; and after college years science, such as physics and chemistry other than what is given in the lower schools, should be taught in special schools, as law and medicine are, after college course.

(36) *William L. Burdick, Greenwich Academy, East Greenwich, R. I.*

1. Physics of a very elementary nature may be introduced in a well graded grammar school. Let the pupil from a few simple experiments understand the most important physical laws. As a rule, teach without books. I think this can form a basis for future work.

2. Less than a year of daily work should be given to physics by high school pupils who are preparing for college; two terms of work for others. It should come the second or third year.

3. The work should be the general study of physics, not making any specialties of its divisions; both inductive and deductive, but particularly the former; for information, and especially for discipline; with text book; with laboratory work as far as practicable. Assume a knowledge of arithmetic and the elements of algebra and geometry. The apparatus should be according to the means. I believe there is no need of much of our costly and showy apparatus, yet the more apparatus the greater success. It depends upon the teacher; some will accom-

plish more with $25 than others with $500. I think, however, as a rule, at least $100 is needed, more if possible.

4. I am not convinced that any physics should be *required* for admission to college on a classical course, but I would advise a pupil to study the science somewhat, since it ought to be presumed; on a non-classical course, two terms to a year.

5. The instruction in college of students who are beginning the work should not differ at first from that of the high school; they will take more time for it; (*b*) none, but they will do better; (*c*) special divisions.

6. I think the common ground sought is in the course described in answer to 3 and 4.

7. Physics should come in the junior year as a prescribed study, accompanied by laboratory work. Plane trigonometry should be a prerequisite for students named in 5 (*c*), not necessarily any higher mathematics.

8. It is an undecided question with me whether colleges should require physics or not. I feel, however, that those who enter college with some drill in it will do much better for this preparation in their college work. They have, moreover, formed the habit of observation, which I hold of immense value.

No disadvantages have followed the requirement, save taking time from other studies, many of which, however, are no more important than this.

9. The reasons why physics should be taught appear to be: interest in nature's laws, power of induction, habit of observation, desire to investigate physical truths, and necessary information.

(37) *William A. Mowry, principal of English and Classical School, Providence, R. I.*

1. I do not think it is desirable to introduce physics in lower schools as a regular study with text books. Much general information can be given by any skilful teacher, but if it were taught as a regular branch it would be, I think, to the serious detriment of the elementary and essential branches.

2. In the high school physics should come the first year. We give a year of daily work.

3. The work should be inductive and deductive; for information and for discipline; with text book; certainly with laboratory work. We take physics simultaneously with algebra. The latter portion of the course comes when the pupils have nearly completed elementary algebra. No rule can be given for the apparatus. Let the teacher make all he is capable of making and buy the remainder required. Let him teach the pupils to make it also. Any "Yankee boy" with ordinary mechanical genius can make much of the needed apparatus, e. g., electrical machines.

4. I could wish that what I have indicated above was required from all students on entering college, but it is not and will not be likely to be. It is perhaps more requisite in a non-classical than in a classical course, but not necessarily.

5. All instruction in college should be less elementary, more thorough, more *extended*, but of the same nature as that of the high school. The college should investigate more thoroughly the causes, the theories, and the philosophy of the phenomena.

6. A course in physics can be planned that ought to satisfy both schools and colleges.

7. Physics should be taken as a prescribed study early in the course, and accompanied by laboratory work. I do not feel positive about plane trigonometry as a prerequisite, and cannot say as to any higher mathematics.

8. With our eastern colleges physics is not required for admission to college. I wish it was. I think this would prove advantageous.

10. I fully believe that the ordinary preparation for college in Latin and Greek is necessary for the true education; but I think also that the elements of physics could be taught to the same pupils in the high school course with very satisfactory results. I would also include elementary chemistry.

(38) *Aaron White, A. M., Cazenovia Seminary, Cazenovia, N. Y.*

1. In lower schools give oral lessons in physics; perhaps one lesson per week, adapted to the grade of the class and always illustrated by experiments. The quickness with which boys and girls catch at an experiment is wonderful, and they will remember it. It gives their minds a lively start and becomes a basis for reasoning in maturer years. Without books. Such a course will awaken a great interest in this department of study.

2. Not less than half a year should be given to physics in high schools and academies; a whole year is better. It should come, I think, in the third year.

3. The work should be, as far as possible, inductive, for the establishment of principles, but deductive also, to develop the full appreciation of these principles; with laboratory work, if time and means permit. We have very many students to whom one term in physics is certainly a great blessing. It is their only opportunity, and, whether in proper course or out of the proper order, I would say to the student, "Get all you can of natural philosophy," and to the teacher, "Do all you can for the student."

(39) *Charles H. Baker, A. B., Columbia Grammar School, New York, N. Y.*

1. It is desirable to introduce physics in lower schools: in the primary school the teacher to awaken interest by weekly talks on every-

day illustrations of influences, &c., of heat, light, &c., and to set the pupils thinking, looking, and listening to what is about them in nature; in the grammar school the pupils to take notes on the same for a future recitation. Teach in the primary schools without books; in the grammar school with apparatus and notes. If under the same teacher, this can serve as a basis for future work.

2. In the high school, at least two hours per week in the last year should be given to physics.

3. The work should be practical so far as to cultivate observational habits by laying down general laws; deductive; for information; with text book; without laboratory work. A knowledge of mathematics through square root should be assumed. With some ingenuity on the part of the teacher, $150 ought to buy and provide all necessaries, including a stock of raw materials for constructing future apparatus.

4. The amount of physics included in Steele's Philosophy, for example, should be required for admission to college on a classical course; (*b*) in a general way, Peck's Ganot's Philosophy, with more problems on a non-classical course.

5. Students who have had no preparation in physics and those who entered college on a classical course should begin with Peck's Ganot; others should have lectures and laboratory work, with experiments.

6. The course described above should satisfy the schools and colleges. I do not think classical and non-classical students should pass like examinations.

7. Students should take up physics in the third year as a prescribed study. Plane trigonometry should be required for students in 5 (*c*); no higher mathematics. Students in 5 (*c*) should take laboratory work.

8. Philosophy "talks" in primary schools stimulate interest and awaken dormant powers. In a grammar class curiosity is constantly aroused and satisfied, to the improvement of the pupil concerned. In a high school only, perhaps, can the majority of children learn the reasons and causes of the phenomena of nature. Many students disliking the classics, but fond of science, have taken scientific courses in college, to the improvement of society at large.

I recognize no disadvantages that have followed the requirement of physics for admission to college.

9. Physics should be taught in the preparatory schools, to cultivate observation, to stimulate inquiry, to provoke invention, to open new fields of investigation, to suggest possibilities of occupation other than business or the professions.

(40) *V. Dabney, principal of New York Latin School, New York, N. Y.*

1. The study of elementary physics without books might be introduced in lower schools. This can serve as a basis for future work.

2. In the last year of the high school 50 hours should be given to physics.

3. The work should be inductive; for information and for discipline; without text book; with laboratory work. Very little mathematical knowledge should be assumed.

4. No study of physics should be required for admission to college.

7. It should be a prescribed study of the third year in college.

8. It should not be required for admission to college, because it interferes with the prosecuting of other studies for which the tender brain is better adapted.

(41) *Alfred Colin, principal of the Preparatory Scientific School, New York, N. Y.*

1. It is desirable to introduce physics in lower schools. For young children experiments are of the utmost importance. At each lesson take one principle and explain by facts within the reach; as, for instance, the pressure of water on the sides of a vessel, and explain how tanks must be constructed. A book is necessary as a memorandum, the primers of Appleton, for example. This can serve immensely as a basis for future work.

2. Some two hours weekly should be given to physics in the high school. In the first hour the teacher should demonstrate; in the second, question.

3. The pupil should go quite through something like Balfour Stewart's Elementary Course, or, rather, Todhunter's Natural Philosophy, for beginners, with Tyndall's or S. P. Thompson's Lessons on Electricity. The work should be inductive and deductive; for information; with text book. Now that much is said about manual labor, let the boys work at home or somewhere else manufacturing apparatus, as recommended by Professor Mayer, of the Stevens Institute, in his works on light and sound. Electricity calls for much ingenuity in designing apparatus that is cheap and instructive. A knowledge of elementary algebra, geometry, and trigonometry should be assumed; the more mathematics the better. The less the apparatus costs the more thorough is the instruction. I believe that physics will be best taught when M. G. Tissandier's ideas as given in La Nature or Physics Without Apparatus shall become general.

4. For admission to college on a non-classical course, viz, technical course require about the scope of Todhunter's Natural Philosophy, as in answer to 3; that is, with problems solved by elementary mathematics.

5. In college these students should have much work in the laboratory.

6. I think the course described in answer to 3 and 4 will satisfy the schools and colleges.

7. Elementary mathematics are necessary for those who want to understand and are not satisfied with mere data. Higher mathematics should not be required, as the colleges are now organized. Physics

should be a prescribed study, and, as I understand it, laboratory work should accompany the other work.

8. All the students who have only studied with me, as recommended in answer to 1, have done well. In two cases I have had pupils prepared as in answer to 3 and 4, and they have done remarkably well. I am not aware of any disadvantage that has followed the requirement of physics for admission to college.

9. The class in physics must not be a theatre where children go to see tricks performed. In elementary schools a few facts must be well mastered, and nothing better than physics shows the usefulness of the elementary mathematics.

10. I am not enough acquainted with the work of the high school and academy to lay out a graduated scheme of studies in those institutions.

(42) *Charles S. Halsey, Schenectady Union Classical Institute, Schenectady, N. Y.*

1. It is not desirable to introduce physics in lower schools unless very elementary and by oral instruction. It should be incidental and not a formal and regular study; without books. This cannot serve as a basis for future work.

2. In the high school there should be one recitation a day in philosophy for two-thirds of a year, and in chemistry for one-third of a year. Physics should come the third year of the course.

3. The high school work should be mainly inductive; for both information and discipline; with text book; with laboratory work. A knowledge of arithmetic and elementary algebra should be assumed. The apparatus would cost $300 and upward.

4. Not any physics should be required for admission to college.

5. The instruction in college should differ from that of the high school in applying more mathematics and taking a higher range.

7. It should come in the third year.

(43) *M. R. Hooper, Rev. M. R. Hooper's Academy, Yonkers, N. Y.*

1. In lower schools physics should be taught experimentally and in such a way as to cultivate the powers of observation and reasoning. In the case of young children it is preferable to teach without books. This is undoubtedly a basis for future work and the only solid one.

3. The work of the high school should be inductive; for information and for discipline; with text book; with laboratory work.

4. For admission to college pupils should be thoroughly grounded in the elements of physics.

8. I have found it hard to form classes in physics. My patrons think it interferes with other studies.

10. Why cannot physics, botany, zoölogy, &c., form a part of the course in schools wherein the hand is trained in the use of tools?

(44) *Rufus B. Howland, Wyoming Seminary, Kingston, Pa.*

1. Unless it is some general instruction given orally, I do not think it desirable to introduce the study of physics in lower schools.

2. Two-thirds of a year seems to me a fair portion to give to physics in the high school. It should come the second or third year.

3. The work should be the study of general principles and applications of them; deductive; for information and for discipline; with text book; with laboratory work, when possible. The mathematical knowledge to be assumed should be plane geometry, besides a thorough drill in arithmetic. The apparatus would cost not less than $200.

4. As much physics as is given in Avery's Philosophy to the subject of sound should be required for admission to college on a non-classical course.

5. For students who begin the work in college the instruction should be more extensive, with more inductive work.

6. A course cannot be planned that will entirely satisfy the schools and colleges. The amount given in answers to 2 and 3 would do fairly for admission to college.

7. Physics should come the second or third year in college as a prescribed study, and should be accompanied by laboratory work. Plane trigonometry should be a prerequisite for all classes named in 5; no higher mathematics should be required from the general student.

9. Pupils of preparatory schools should study physics for discipline and to gain facts and principles for use in life.

(45) *H. A. Strode, Kenmore University High School, Amherst, Va.*

1. The study of physics may be introduced in grammar schools to the extent of the course embraced, say, in Ganot's elementary work; *with* book.

2. In the third or fourth year of the high school not less than 100 hours should be given to physics.

3. Use a text book. A knowledge of a few books of elementary plane geometry should be assumed.

(46) *John A. A. West, M. D., A. M., Academy of Richmond County, Augusta, Ga.*

1. In grammar schools physics may be introduced to a limited extent and of a very elementary character. Use a text book. This can serve as a basis for future work.

2. One-third of the student's time in the academy should, in my opinion, be devoted to physics. It should be taught throughout the entire course.

3. The work should be practical and theoretical; inductive and deductive; for information and for discipline; both with and without

text book; with laboratory work. Very little mathematical knowledge should be assumed. The apparatus would cost from $200 to $500.

4. Very little physics should be required for admission to college on a classical course. A slight knowledge of chemistry, geology, and astronomy should be required on a non-classical course.

5. The instruction should be the same as that of the high school for those who begin the work in college; the instruction for others should be mathematical.

6. I believe the course described in answer to 3 and 4 will be likely to satisfy the schools and colleges.

7. The student should take physics the first year in college as a prescribed study, with laboratory work. Plane trigonometry should be a prerequisite for students named in 5 (*b*). In a scientific school higher mathematics should be required.

8. My observation has led me to trace a higher degree of proficiency in students who have been taught physical studies.

I do not believe that any disadvantage has ever followed physical instruction, while I believe I have noticed a want of practical common sense in persons who have neglected it.

9. Physics should be introduced in preparatory schools to teach something useful to the pupils which they will eagerly learn. In this way the mind is disciplined.

10. When one reflects how few persons there are who know the composition of a drop of water or a grain of sand in comparison with those who are familiar with a Latin verb or Greek preposition, and how much each of these separate classes of educated people is accomplishing, it seems plain to me that instruction in physics is of the utmost importance to our people; for beyond all doubt scientific men have done, are doing, and will do more for the advancement and well being of our country than any other class of her citizens.

(47) *Rev. J. Babin, A. B., Collegiate School, Cincinnati, Ohio.*

1. Physics to a limited extent may be introduced in lower schools. Let the course be one hour per week for a year and the instruction what would impart such knowledge of the general properties of matter as should be possessed by any liberally educated person. I know of no satisfactory text book on the subject. This will not serve as a basis for any special course.

2. Physics in the high school should be very elementary and could come about the middle of the 4-year course. (I can only speak for boys who will go to college.)

3. The prevailing character of high school work should be languages and mathematics, Latin being the medium of discipline; inductive and deductive; for information and for discipline; with text book; without laboratory work. A knowledge of algebra and geometry should be *assumed*. Of course algebra includes arithmetic.

4. No study of physics should be required for admission to college. It is an impertinence for any college to examine a boy in chemistry, &c., on matriculating.

5. For students who enter college on a classical course the instruction should be the same in every respect as that of the high school.

7. Physics should be a prescribed study.

8. The requirement of physics for admission to college appears preposterous to me. The examinations are intended to test the candidate's ability to profit by the college course, and it stands to reason that that does not depend upon his knowledge of a few facts of nature. Hundreds of boys have their education ruined by going to college without the necessary knowledge of languages. Too often the college work is anticipated with disastrous results.

(48) *T. L. Sewall, Indianapolis Classical School, Indianapolis, Ind.*

1. As much physics as is contained in the primer in Appleton's series might be taught in lower schools, both with and without books. This can serve as a basis for future work.

2. Perhaps one hundred hours (more rather than less) should be given to physics in the third or fourth year of a high school course.

3. The work should be inductive; for information; both with and without text book; with laboratory work. A knowledge of arithmetic, algebraic equations, and plane geometry should be assumed.

4. I think the Harvard requirements in physics are proper.

5. The instruction should be the same as that of the high school for students who begin the work in college, and more advanced and experimental for others.

7. Students should take up physics in the first year of a college course. It should be a prescribed study. Plane trigonometry should be a prerequisite for students named in 5 (*c*), if any. It is doubtful whether higher mathematics should be required or not. Laboratory work should accompany the other work.

8. The requirement of physics for admission to college compels preparatory schools to teach it. I know of no disadvantages that follow the requirement.

10. Ours being a preparatory school, we have no option. We must teach what is required by the colleges, e. g., Harvard.

(49) *Miss C. S. Burnett, Tullahoma College, Tullahoma, Tenn.*

1. In the first grades introduce physics by oral instruction, giving familiar talks on common subjects. In the grammar school use a book. I would only give the elements of philosophy. I think this can serve as a basis for future work.

2. In the high school I would not give to physics more than six months. Let it come the second year.

3. I would teach by topics, using books as references. The work should be deductive: for discipline mainly: with text book; with laboratory work. Assume a knowledge of arithmetic as far as proportion at least, the further the better. I could do well with $50, but would prefer $100. A full apparatus would cost more.

4. For admission to college on a classical course one term of physics should be required in an ordinary college, and one year of physics in Harvard or Yale. On a non-classical course the elements should be well learned by lectures and experiments.

5. Students who begin the work in college should study more for information. Students named in 5 (*b*) should use apparatus and students named in 5 (*c*) should refer to reference book.

6. I think the course described in answers to 3 and 4 will satisfy the schools and colleges.

7. Physics should be a prescribed study in the second year of a college course. Laboratory work should accompany the other work for all, if possible. Plane trigonometry should be a prerequisite for the highest grade only; higher mathematics are desirable, but are not essential.

8. This study leads the mind out better than any other. Nature is interesting to all. Physics awakens a desire to know more of the wonders of the world in which we live. It teaches pupils to see as well as to think.

The only disadvantage I can see is that which comes from an imperfect knowledge of any branch. If properly taught no disadvantage will follow.

9. Our pupils become weary of the common branches. I would early give the elements of all sciences. The knowledge gained is of practical use.

10. The ground is well covered. I believe we teach too much grammar and arithmetic. I would welcome any change. I believe in oral instruction in all grades. Let pupils have access to books, but do not permit them to commit them to memory without understanding them. A work on physics similar to Jane Taylor's work on physiology would meet the requirements of our primary and secondary grades and would be valuable in any grade.

III. FROM TEACHERS OF PHYSICS IN COLLEGES AND UNIVERSITIES.

(50) *Marshall Henshaw, lecturer on physics, Amherst College, Amherst, Mass.*

1. I do not think it desirable to introduce physics in lower schools. In these schools the whole work should be devoted to the elements of a good English education. The teacher can make an occasional diversion by a talk on history or some facts in science; if at all, without books. This cannot serve as a basis for future work, except as all knowledge does.

2. Those going to college or technical school can give their time more profitably to other things than physics. Other high school pupils should be taught the general principles and facts of physics, and a year of daily work will serve. It should come in the last year.

3. The work should be thorough and accurate, forming habits of careful observation and induction; inductive and deductive; for information and discipline; with text book, by all means; without laboratory work. A thorough knowledge of algebra, plane geometry, and trigonometry should be required. The apparatus should be used by the instructor, in illustration. It should be first class as far as it goes, and the further the better. The cost would be from $1,000 to $5,000, according to the size and character of the school.

4. No physics should be required for admission to college, except such as every student worth sending will gather. Previous work generally starts the student wrong and must be undone.

5. For students who begin the work in college the instruction should be more extensive, complete, and of a higher order every way than that of the high school.

6. A course can probably be planned that will satisfy the schools and colleges. I do not know whether the course described in answer to 3 and 4 is the common ground sought or not.

7. The student should take up physics in the junior year. It should be a prescribed study as far as to enable every educated man to read, converse, speak, and write intelligently on any subject connected with physics. Those only who expect to make physics a specialty should take laboratory work. Plane trigonometry should be a prerequisite for all students. For students who pursue physics theoretically, i. e., by mathematical analysis, higher mathematics should be required.

8. The tendency is to introduce too many subjects into our primary schools, and thus crowd out or shuffle over the fundamentals. In the higher schools students are put to experimenting when unqualified for it and with inadequate means. Thus habits of slovenly experimenting and inconsequent induction are formed, or the student is disgusted with the unsatisfactory nature of the whole thing. I do not believe that any advantage has been derived from requirements in physics for admission, except in very rare cases. A loss of time and work and a necessity for undoing what has been done wrong are the disadvantages.

9. All educated persons should have the advantage in a college course of a very complete and thorough instruction by text book and by experimental lectures, with the best and fullest apparatus available. The number of those who have the capacity and taste to make physics a specialty, in comparison with the whole number of students in a college, is very small, not more than 1 in 20: in Edinburgh University it is 5 to 8 out of more than 1,000; in the whole of Oxford University it is 12 to 15; in Berlin about 30 out of 6,000 students. To put others into laboratory work is a waste of time and money and an injury

to the students. Especially is a loose way of experimenting, with cheap apparatus, and obtaining only the remotest approximation in results—results which would not of themselves even suggest the principle or law—very much to be deprecated.

(51) *Wolcott Gibbs, Rumford professor, Harvard University, Cambridge, Mass.*

1. In lower schools I would teach the elementary principles of physics and experiment, partly to give a taste for the subject and partly to cultivate powers of observation and reflection; without books. If the teaching is good I think this would serve as a basis for future work.

2. In the high school a year of daily work would not be too much. I would distribute the teaching over the four years.

3. The work should be experimental as far as possible; both inductive and deductive; for information, and especially for discipline; without text book, if possible; certainly with laboratory work. Some acquaintance with algebra and geometry would be desirable. Of course arithmetic would be necessary. I am not well posted as to the cost of school apparatus. Much that is good is now made at a low cost.

4. A really good and thorough elementary knowledge of physical principles should be required for admission to college on a classical course; the same on a non-classical course if there is to be a thorough study of the subject in college.

5. The college instruction should be the same in kind as that of the high school, but higher in degree.

6. I think the course described in answer to 3 and 4 will satisfy the schools and colleges.

7. Physics should be a prescribed study of the freshman year. All should take laboratory work. Plane trigonometry should be a prerequisite. Higher mathematics should not be required for admission to college, but of course for the fuller study.

8. I have had no experience bearing upon questions 1 and 2. As to 4, I can only say that those students who have had a really good previous training acquire habits of mind which make their subsequent studies in college far more easy and more profitable. The real object in teaching physics is to train the mind to habits of accurate observation and of precise and clear reasoning.

I know of no disadvantage that has followed the requirement.

(52) *Ambrose P. Kelsey, Ph. D., professor of natural history, Hamilton College, Clinton, N. Y.*

1. Teach physics in grammar schools by using some book answering common questions, and not too much extended. My own experience has proved such a course useful. Do not attempt experiments. This cannot serve directly as a basis for future work.

2. In the high school go twice over the work, the second time using arithmetic, geometry, and algebra freely. It should come the third year.

3. The work in physics should be experimental as far as possible; inductive and deductive; for information; with text book; with laboratory work, if practicable. A knowledge of plane geometry and algebra through quadratics should be assumed. I think I could select for $300 or $400 enough apparatus for any high school in which the recitation room is not over 25 or 30 feet long: there is a relation between the size of the room and of the apparatus.

4. No physics should be required for admission to college on a classical course; on a non-classical course the common school text books.

6. I do not think a course in physics can be planned that will satisfy the schools and colleges.

7. The student should take up physics in college as soon as calculus is finished, not before.

8. I have had no experience which will enable me to answer the question in regard to the requirement of physics. In normal schools (in which I have had a very extended experience) physics was never required.

(53) *F. C. Van Dyck, professor of physics, Rutgers College, New Brunswick, N. J.*

1. In lower schools introduce what I may call qualitative physics, such as some of the elementary works embody, and to a sufficient extent to enable pupils to *use* common instruments: thermometer, barometer, &c. Use a book made on the Tyndall basis. This can undoubtedly serve as a basis for future work.

2. I have had no experience and can give no opinion as to the time that should be given to physics in the high school.

3. The high school work should be inductive; for information; with text book as above; with laboratory work. A knowledge of arithmetic should be assumed. The minimum cost of the apparatus might be $100.

4. For admission to college I would not require any previous knowledge of physics until the schools generally teach it, or at least are supposed to do so. It is better to begin on the plane of the average student at entrance.

5. The instruction in college should differ from that of the high school in having practical laboratory work and numerous problems.

6. A course in physics can be planned that would probably satisfy the schools and colleges.

7. Physics should be taken the junior year in college as a prescribed study. Laboratory work should accompany the other work; at least let the students illustrate their recitations with apparatus. Plane trig-

onometry should be a prerequisite; higher mathematics should not be required at present.

8. The removal of the element of strangeness of terms is about all the benefit obtained by preëntrance study. I think the novelty of a subject often constitutes its main difficulty. The repertory of *facts* is of use, but that of *terms* is of more benefit; i. e., to a student passing from the study as a source of information to its prosecution as a means of mental discipline.

When the preparatory study has not been well directed, false notions are sometimes fixed in the pupil's mind. Occasionally, also, a pupil fancies he knows so much that he neglects careful study, especially, at first, in mechanics, the basis of the subject. These are the disadvantages of the requirement.

9. The main thing I should expect in the study of physics in the preparatory schools is a habit of attention to experiments and a training in distinguishing essential from non-essential conditions.

10. I venture the opinion that too much time, comparatively, is spent on heat, electricity, &c., and that the extensive basis of mechanics, which even arithmetic covers, is skimmed over. A book which taught the main points of leverage, &c., and the laws of motion could have a special section defining—without fully discussing—the sine, cosine, and tangent, and would, with arithmetic, suffice to teach beginners thoroughly as far as they could go in a common school.

(54) *H. W. Harding, professor of physics, Lehigh University, South Bethlehem, Pa.*

1. Physics should not be introduced in lower schools under the present system of such schools.

2. If text books alone are used, six months' study of physics in the high school will do; if laboratory work is done, then not less than a year should be given to it. Let it come in the last year.

3. The work should be, first, the acquirement of the true method of study in physics; second, a complete understanding and entire familiarity with the leading principles and facts of physics. The extent of the course should be such as is laid down in the latest and best text books, such as Gage's, Avery's, &c. The work should be for information and for discipline; with laboratory work most assuredly. A general knowledge of algebra (as far as radicals and equations of the second degree) and of plane geometry should be assumed. The apparatus would cost from about $300 to $500, according to prices of laborers (carpenters, &c.) in the vicinity.

4. The amount of physics required for admission to college on a classical course should be that laid down in answer to 3, involving the experimental method as far as possible. The mere study of the text books, without practical work, might be accepted if time was pressing. In either case the whole of chemical physics should be covered in the course.

On a non-classical course the amount laid down in answer to 3, made as thorough as possible. In this the laboratory work and practical method should be an essential part of the course.

5. For students named in 5 (*a*) and 5 (*b*) the instruction should differ from that of the high school only in extending the same general course. The non-classical students should do different and more advanced and better work.

6. The course described above should satisfy the schools and colleges.

7. Physics should be a prescribed study, and should not come earlier than the second year in college. Plane trigonometry should be a prerequisite for all, if possible, but it might be omitted for students named in 5 (*a*) and 5 (*b*). Higher mathematics should be required only for the most advanced or post graduate courses. It is not necessary that elementary laboratory work should accompany the other work if the *regular* laboratory work covers all the ground.

8. As Lehigh University has not heretofore required the study of physics for admission, I can speak decidedly as to the disadvantage of *not* having such requirement. Few students know anything of physics on entering. Instead of giving advanced and better work than the high school, I have been obliged to repeat the elementary course, adding here and there, where time permitted, the fuller development of special important points. This, of course, applies only to the general course of physics that must be taken by all the students. The special advanced courses in this subject are very different.

The only disadvantages of the requirement that my experience has shown me are those resulting from bad previous training, careless and slovenly ways, &c.

9. Teachers of the primary schools are usually not qualified. It is better to postpone the study of physics than to have it simply memorized without explanation and not properly understood. I hold the aim of the teacher in the high school to be, first, to give as much information as possible on the subject, and, secondly, to make the student always a correct and also, so far as time allows, an expert worker in the field of physical research.

(55) *Charles S. Hastings, Ph. D., assistant professor of physics, Johns Hopkins University, Baltimore, Md.*

1. It is not desirable to introduce physics in lower schools.

2. In the high school perhaps a year, either the third or the fourth, should be equally divided between chemistry and physics.

3. The work should be such as to give a familiarity with the more important phenomena; for information; with text book; without laboratory work, but with experimental demonstration. No more mathematical knowledge should be assumed than is implied by the year in the course. It is impossible to say how much the apparatus would cost. More depends upon the teacher than upon anything else.

4. For admission to college require only such study of physics as to give a knowledge of the more important phenomena and the terms necessary to describe them.

5. The college course should give more complete knowledge of phenomena and the elements of the philosophy of physics.

6. I think a course can be planned to satisfy the schools and colleges.

7. Physics should be an elective study. The students should take it up when they have mastered plane trigonometry. Higher mathematics should not be required. If possible, laboratory work should always accompany the other work.

8. It is certainly of enormous advantage to a student entering a college course to have a familiarity with the terminology of physics and the common phenomena.

The only disadvantages, as far as my experience goes, depend on imperfect teaching. For that reason I should advise confining the high school course chiefly to a study of phenomena.

H. A. Rowland, professor of physics, adds:

3. The high school work should give a familiarity with the laws deduced from the more important phenomena; deductive; for information and discipline; with text book. I should say that the apparatus would cost from $2,000 to $5,000.

5. The instruction in college should be more complete than that of the high school.

7. Physics should be a prescribed study in college.

8. The requirement of physics for admission to college proves advantageous because the student cannot too soon acquire scientific methods of thought.

9. The mind must be somewhat advanced before this subject can be appreciated.

10. Under no circumstances should the study of physics be attempted without demonstration given with quite complete apparatus, as I believe a positive injury results from any other course. The student must see the experiment and be taught to draw his conclusions from it.

(56) *Francis H. Smith, professor of natural philosophy, University of Virginia, Charlottesville, Va.*

1. In lower schools it is desirable to introduce physics to the extent of familiarizing the pupil with the general properties of air, water, and solids. These properties would include their relations to heat, light, and electricity. The character of the teaching should be experimental, any unavoidable reasoning being reduced to as short a step from the experiment as possible. If time allows, let the pupil repeat the simple experiment in person and be encouraged to contrive others. Show him how the apparatus of his mother's cupboard and kitchen may be also used as physical apparatus. Teach both with and without a book, the

book to be used as a syllabus and help to the oral teaching. To make this serve as a basis for future work should be the leading design.

2. In regard to time in the high school, physics should have at least an equal share with other studies. If ancient classics are properly taught, physics should come in the last two years.

3. The character of the work should be the same as in the primary school — with more prominence to the deductive part — and the working of good problems; inductive and deductive; for information and for discipline; both with and without text book; with laboratory work by all means. A knowledge of elementary algebra, geometry, and trigonometry should be assumed. Excellent results could be achieved with apparatus costing not more than \$1,000 (nay, even \$500). It depends on the skill and leisure of the teacher. The best experiments for instruction are made with extemporized apparatus. One must have, however, a good air pump and electrical machine.

4. If the college belongs to the system which includes high school and primary school, it should require the preparation furnished by these.

5. The instruction in college should differ in extent and minuteness, but not in kind, from that of the high school.

6. I think a course can be planned that will be likely to satisfy the schools and colleges. The course described above is the common ground sought.

7. Physics should be a prescribed study, and should come, I think, in the third and fourth year of the college course. Plane trigonometry should be a prerequisite for all. Higher mathematics are very desirable, but should not be *required* of the mass of students in the present condition of mathematical training. All should be allowed, urged, and perhaps *required* to take laboratory work. If the teaching is what it should be, no compulsion, however, will generally be necessary.

8. I have never taught physics in a primary or high school, but have been teaching it for thirty years in an institution where its study is elective, and I think I have good reason for the views above expressed.

9. A knowledge of physics, somehow gotten, good or imperfect, systematic or confused, underlies our whole life and enters directly or indirectly into all practical arts and professions. Sound information in regard to it, therefore, is of primary importance; at the same time its proper study trains our senses, our power of observation, our reason, and our taste.

10. To successfully accomplish the object set forth it is *indispensable* (1) that the *teacher should know physics* himself, not with book knowledge merely, but by actual contact himself with natural phenomena. He should be an observer and experimenter. (2) He *must have time* enough allowed him for devising experiments and superintending each pupil personally. If he is crowded, as is usual in schools, with multifarious and engrossing duties besides, this department will be perhaps more than useless. Immense sums are wasted or worse than wasted in

our land by injurious attempts at economy in this matter. Better omit the teaching of physics altogether in our preparatory schools, unless sufficient time can be allowed the teacher as well as the pupil for its proper prosecution.

(57) *D. B. Purinton, professor of mathematics, West Virginia University, Morgantown, W. Va.*

1. Familiar talks, lectures, and object lessons on the simpler principles of physics and the more obvious facts of the study might be introduced in lower schools; without books. This can serve as an incentive, but not as a basis for future work.

2. One year at least should be given to physics in the high school, but the recitations might come on alternate school days only. It should come in the third or fourth year.

3. The work should be inductive; for information; both with and without a text book; with laboratory work if possible. No mathematical knowledge beyond algebra and geometry should be assumed. The apparatus would cost from $500 to $1,000.

4. No study of physics should be required for admission to college on a classical course. There should be required on a scientific or technical course the completion of some elementary work requiring six months at least.

5. In all cases the instruction should seek more for principles and discipline and include more mathematics.

6. I think a course in physics can be planned that will satisfy the schools and colleges.

7. Physics should come in the second or third year in college as a prescribed study. Plane trigonometry should be a prerequisite. Analytical geometry and calculus are very desirable. All should take laboratory work.

9. Physics should be taught in the preparatory schools to open the young student's eyes to the facts lying about him, induce habits of careful observation, and awaken a growing taste for physical knowledge.

(58) *Brown Ayres, professor of physics, University of Louisiana, New Orleans, La.*

1. It is doubtful whether it is desirable to introduce physics in lower schools. If the method of instruction could be made experimental and inductive, some good might come of the study at this early age; without books as they are now written. This can serve as a basis for future work to a small extent only.

2. In the high school give to physics at least a year, with laboratory practice in simple determinations of physical constants and verification of fundamental facts. The last year is preferable.

3. The work should be inductive; for discipline; with text book; with laboratory work. A knowledge of elementary algebra and geometry

(if practicable) should be assumed. The apparatus required would be inexpensive if the teacher was ingenious in devising simple experiments, say three hundred dollars' worth.

4. The requirement of physics for admission to college should be substantially the work suggested above.

5. Students who begin the work in college should have the same instruction as that of the high shool, but with more exactness. For others the instruction should be of the same kind, but fuller and more thorough, with elementary mathematical theory of the science.

6. I think the course described in answer to 2 and 3 will satisfy the schools and colleges.

7. Physics should be taken the sophomore, junior, and senior years as a prescribed study. Plane trigonometry should be a prerequisite for students named in 5 (*b*) and 5 (*c*), but those in 5 (*a*) would not necessarily require it. Higher mathematics should not be required, except for the later years. All should take laboratory work.

8. I have found the inductive method to produce good results with students of high school grade, while the mere cram method has been in most cases a failure.

9. My aim in teaching physics in the primary school would be to give information and stimulate the observing powers; in the high school, to give preparation for more thorough collegiate work.

10. More thoroughness is required in the instruction in physics, and this will only be attainable when the science is recognized as being entitled to the same degree of preparation that is expected of a collegiate student of the classics or of history or modern languages. The difficulty in the way of the carrying out of the scheme in the elementary schools would be the difficulty of obtaining the proper kind of teachers.

(59) *C. C. Cody, A. M., Ph. D., professor of mathematics, Southwestern University, Georgetown, Tex.*

1. An elementary course in physics extending through two years might be introduced in the lower schools. It is best to teach without books; this, however, depends upon the teacher. This can serve as a basis for future work.

2. At least a year of daily work should be given to physics in the high school. Let it come the last year.

3. The work should be with text book, accompanied by experiments with a few lectures; inductive; for discipline; with laboratory work. A knowledge of plane geometry should be assumed. The apparatus would cost $1,200.

4. For admission to college require a knowledge of some elementary work, such as Gage's or Avery's.

5. The college instruction in physics should be on the same plan as that described under 3, with the course extended for students named in 5 (*b*) and still more extended for those named in 5 (*c*).

6. I think the schools and colleges would be satisfied with the course described under 3 and 4.

7. Physics should be a prescribed study and should come the first college year. Plane trigonometry should be a prerequisite for students named in 5 (*b*) and 5 (*c*); no higher mathematics. All should take laboratory work.

8. The requirement of physics for admission to college enables the professor to do more efficient and more advanced work. Sometimes students in our State come to us imbued with the fallacious doctrine of Wilford Hall.

9. Students should be brought to an empirical study of nature as soon as possible; hence the reason for the study of physics in the preparatory schools.

10. I am much pleased with the plan you have adopted and think it will work to good results.

(60) *L. B. Caldwell, East Tennessee Wesleyan University, Athens, Tenn.*

1. Most certainly I think the study of physics desirable in lower schools. It is the basis of the "reason why" in nature. Let the instruction embrace the reason why of that which comes within the range of the studies of a given course, which is always graded with reference to a high school or college course. Use books, that it may be taught systematically. As certainly as the multiplication table can this serve as a basis for future work.

2. Not less than one year of daily work should be devoted to physics in the high school. Give the pupils just as much as possible of the "reason why" and the nature of what they are certain to meet. In this case physics should come in the fourth year.

3. The work should always be practical, giving the "why" of what must make up the pupils' lives; either inductive or deductive, but make it plain; for information always; with text book; with laboratory work. Assume no more mathematical knowledge than may be necessary to illustrate the experiments. Teach mathematics by itself; leave the metric system out entirely. The apparatus need not necessarily be expensive. All the principles of physics may be illustrated by simple apparatus. You may increase the expenditure in electricity if possible.

4. On a classical and non-classical course the requirement in physics for admission to college should be the same.

5. Compel students to prepare in physics before entering college. Do not let them begin the work there. The instruction should begin where the preparatory course left off.

6. Most certainly a course can be planned that will be likely to satisfy the schools and colleges. I think the course described under 3 is the common ground.

7. Physics (not elementary) should be a prescribed study. The

student should take it up the third year. Plane trigonometry should be a prerequisite for both 5 (*b*) and 5 (*c*), if for either, but I would leave mathematics out of physics. I think higher mathematics should not be required. All students should take laboratory work if it is necessary to illustrate the principles.

8. Nothing is more forcible to me than the good results all through my life from the study of physics when a boy. In my judgment there is no science which at every turn of life lays before one an open text book so full of practical facts as physics does. I fear its importance is not fully realized. In my experience no disadvantage has followed besides that which arises from insisting on thorough preparatory work in any science.

9. I cannot answer this more fully than to say that physics should be taught in the preparatory schools because it is the answer to the question "Why is it?" Daily toil would be pleasanter if the why of things was evident always.

10. Widen the field generally allotted to physics by giving very much more of the little details of life work and the "why." Leave mathematics largely for its own field and the metric system entirely out.

(61) *T. C. Mendenhall, professor of physics, Ohio State University, Columbus, Ohio.*

1. It is desirable to introduce in lower schools the study of physics to the extent of two or three lessons per week of a half hour each; these to have to do with the more readily recognized phenomena of nature from which the more elementary laws of "motion and matter" are deducible; experimentally illustrated by the teacher whenever possible and in the simplest way. A *good* elementary book or "primer" would be desirable. This can serve as a basis for future work, but most of it will need to be repeated in a more systematic way.

2. In the high school and academy the time given to physics should not be less than a year of daily work (200 hours), particularly if "only a portion of the graduates go to college." It should come not earlier than the third year.

3. The high school work should be full experimental illustrations, whenever possible, *from the lecture table of the teacher*. It should be to some extent both inductive and deductive; for both information and discipline; with text book; with laboratory work, but for the teacher and not the pupil. A knowledge of ordinary algebra and geometry should be assumed. Enough plane trigonometry can be taught by the physics teacher in a half hour to be of great service. The expense of the apparatus would depend very greatly on the teacher. Three hundred dollars in the hands of a good instructor would answer the purpose very well.

4. The high school course in physics already referred to should be required for admission to college on a classical course. The same on a

non-classical. Of course, in some high class technical schools it may be necessary to require more, but generally the additional requirement would be mathematics.

5. Students should not begin the work in college. The instruction should be more extensive and more exacting than that of the high school and laboratory work should be added.

6. I think a course can be planned that will be likely to satisfy both schools and colleges. The answer to 3 and 4 is the common ground sought.

7. The year the students take up physics depends on the mathematical course; perhaps in the sophomore or junior year. It should be a prescribed study. Plane trigonometry should be a prerequisite for all, and at least the elements of "coördinate geometry" in addition, but no higher mathematics.

8. I have watched the results of teaching physics in all grades. I regard it as healthful and invigorating in all if properly handled. Its requirement for admission to college is found to be advantageous in stimulating teachers in secondary schools (high schools and academies). There are no disadvantages that I am aware of.

9. This study aims at the discipline of the mind, the acquisition of information (secondary importance), and some degree of familiarity with experimental methods of investigation, to the end that the student may comprehend the scope and limitations of this method. Here absolute accuracy (mathematics) comes tangent to the uncertainty of observation, and the value of evidence based on the latter is, for the first time, fully appreciated. As merely furnishing material for mathematicians to manipulate, it is of great value.

10. In the present state of the admission of its claims the following seems to me to be a necessary and sufficient course in physics: (*a*) Primary, two or three lessons per week of a very elementary character extending through one year. (*b*) Secondary (in a high school or academy), 200 lessons of one hour each (one year), text book in the pupil's hands, principles fully illustrated by experiment on the lecture table of the teacher; to follow geometry in the course. (*c*) Higher (college), not earlier than sophomore year, after plane trigonometry, 150 hours (in one year) of exacting work with the *principles* of the science, using a full text book and accompanied by lecture from the professor, *not* to any extent experimental. During the junior or senior year at least six hours per week of the laboratory work, devoted mostly to one or two divisions of the subject, attention being given to the *quality* rather than the *quantity* of the work.

(62) *Albro D. Morrill, Farmers' College, College Hill, Hamilton County, Ohio.*

1. In lower schools the instruction in physics should be by demon*stration* in suitable language, accompanied by experiments and by

direction for simple experiments to be performed at home, without books for the pupils. This can serve as a basis for future work.

2. In the high school physics should come in the first or second year. Give to it at least a year (200 hours) of daily work.

3. The work should be experiments first, then recitation; mainly inductive; for information, but mainly for discipline; with text book for reference; with laboratory work; assume a knowledge of arithmetic, the elements of algebra, and the elements of geometry. The apparatus would be transient and would cost from $1 to $2 per pupil for the first class, and less after getting started.

4. For admission to college on a classical course require the first 138 pages of Gage's Physics, or an equivalent (i. e., mechanics); on a non-classical course require as much as is comprised in Gage's Physics, with experiments.

5. For students who begin the work in college the instruction at first should be the same as that of the high school; for students named in 5 (*b*) the subjects should be treated more fully. Non-classical students should have advanced lectures, quantitative laboratory work, and reference library.

6. A course in physics can be planned that will satisfy the schools and colleges.

7. Physics should come in the second year. Plane trigonometry should be a prerequisite for students under 5 (*c*); no higher mathematics should be required. Elementary laboratory work should accompany the other work for students under 5 (*a*) and 5 (*b*). Elementary physics should not be taught in college.

8. An increased general intelligence and a greater ability to profit by other studies are the results obtained by the requirement of physics for admission to college.

There are no disadvantages, as far as I know.

9. Physics should be taught, in the lower schools, to give familiarity with the most common natural laws and to cultivate observation; in the high school, to cultivate observing power, judgment, and clearness of statement.

(63) *A. C. Crist, professor of natural sciences, Ohio Central College,*[1] *Iberia, Ohio.*

1. In lower schools teach the primary principles of physics, and, if possible, with illustrations. Children at a very early period of their education become interested and are better prepared to understand their grammar; without books at first. This will create a desire for future study.

[1] This institution appears among the colleges in the Report of the Commissioner of Education for 1881, but is placed among the secondary schools in the report for 1882–'83, which was received after this matter was all in type.

2. In the high school have three or four recitations a week during the entire course.

3. The work should be inductive and deductive; for information and for discipline; with and without text book; with laboratory work, by all means. Assume a knowledge of mathematics through trigonometry. If the apparatus is judiciously selected, from $300 to $500 will go a long way.

4. I think there should be two entirely different courses in physics, one for those who take a full collegiate course, either classical or scientific, and another for the great mass of pupils who attend the public schools, but never attend schools of higher grade.

6. I do not think a course can be planned that will be likely to satisfy the schools and colleges.

7. Physics in college should come the last three years.

8. My observation has been that it is profitable to introduce science as suggested. For those who go to schools of higher grade it should all be gone over again; for those who do not it is of great value during all their future lives in stimulating thought and future study as opportunity is afforded.

(64) *H. S. Carhart, professor of physics, Northwestern University, Evanston, Ill.*

1. In lower schools give familiar lectures and experiments designed to familiarize pupils with the terms used in physical science and with simple fundamental principles. Teach without books, though "Science Primers" might be employed. This will lay the foundation for future work.

2. In the high school give a year of daily work, if possible; certainly not less than 130 or 140 hours (two terms). It should come in the fourth year.

3. The work should be with text book, supplemented by oral lectures and by illustrations; inductive; for both information and discipline; with laboratory work if possible. Assume a knowledge of higher arithmetic.

4. The amount of physics given under 2 should be required for admission to college on a classical course. Probably it is not practicable to require a larger amount of non classical than of classical students.

5. The instruction of students who begin the work in college should be more thorough, with the use of more mathematics. Non-classical students should be permitted to spend more time on advanced physics.

6. I think the course described in answer to 3 and 4 will satisfy the schools and colleges.

7. Physics should be taken in the junior year as a prescribed study. Laboratory work is very desirable, particularly for students named in 5 (*b*) and 5 (*c*). Plane trigonometry should be required for all and analytical geometry and calculus for those who take advanced physics.

8. Students come to me with very unequal attainments in physics. The greatest advantage gained thus far by the requirement is the familiarity that the student has with the ideas involved in physics. In the teaching of science no less than in the teaching of language, it is necessary for the mind to dwell on the principles for a considerable period in order that they may be assimilated and become so well known as to seem always to have been known.

I have not observed any disadvantages.

9. In addition to the importance of a knowledge of physics my reasons for the study are given in 8.

10. I should suggest that the laboratory work for preparatory students should be in the line of illustrative experiments, while that for college students should be not so much the demonstration of general laws as the measurement of physical constants, the quantification of physical science.

(65) *Milton L. Comstock, professor of mathematics, Knox College, Galesburg, Ill.*

1. Introduce into lower schools a sufficient amount of physics to give the main facts, and as far as may be to explain the elementary principles of the science; with books. To a very limited extent this can serve as a basis for future college work.

2. Not less than one hundred hours, one hour each day, should be given to physics in the high school. It should come after the pure mathematics, say in the third year.

3. The work should be accurate; inductive; for information; with text book; without laboratory work. A good knowledge of arithmetic and the elementary principles of geometry should be assumed. The apparatus would cost from $250 to $300.

4. No physics should be required for admission to college.

5. The instruction in college for classical and non-classical students should be both inductive and deductive, and for discipline as well as for information.

6. Possibly a course can be planned that will satisfy the schools and colleges. The common ground to be sought is the course described in answer to 3.

7. Physics should be a prescribed study. Let it come in the third year. Elementary laboratory work would be advantageous. Plane trigonometry should be a prerequisite for all classes, because no one without a good knowledge of trigonometry can learn physics. No higher mathematics, beyond a slight knowledge of analytical geometry, should be required.

8. I have had no experience in the requirement of physics that would be of value.

After taking a high school course students sometimes think they

know all about natural philosophy and seem to lose interest in the mathematical investigations.

9. Every person should know the more simple principles of physics; hence accuracy is necessary. The instruction should be mainly inductive, because in general the minds of pupils in primary schools are not mature enough to appreciate deductive reasoning. The instruction should be for information, because discipline can be secured more readily by other studies, such as geometry, &c. To acquire discipline from the study of physics requires a high order of thinking. I would require the use of a text book, because young students are but little benefited by lectures, except as they may accompany illustrative experiments. Indeed I think no complete knowledge of any science can be obtained in a reasonable time without the use of a carefully prepared text book.

10. (1) One danger will be from incompetent teachers.

(2) Another danger in our public schools is the tendency to introduce everything possible into the course. Possibly the time given to physics would be taken out of the time needed for more important elementary and preparatory studies, and especially would there be danger of this in the case of those who are preparing for a college course. The result is likely to be imperfect knowledge everywhere, exact and thorough knowledge nowhere.

(3) The text books used in colleges should be of a much higher grade than those used in preparatory schools.

(66) *Benjamin F. Thomas, Ph. D., professor of physics, University of the State of Missouri, Columbia, Mo.*

1. In lower schools physics might be introduced mainly in the form of brief simple talks, with experiments in mechanics, sound, heat, light, and electricity, after the style of Professor Mayer's books on sound and light, or Professor Tyndall's on electricity. Let this be an exercise before the whole school. Without books. This can serve as a basis for future work.

2. One year, the third, should be given to physics in the high school.

3. The work should be theory, with demonstrations and solutions of problems; *inductive* and deductive; for information and for *discipline*; with text book, with average teachers; with laboratory work during the second half of the course. Assume a knowledge of algebra through equations of the second degree and some geometry. One thousand dollars will procure a cabinet with which much may be done. More depends on the teacher than on the apparatus. A good teacher of physics will do more with nothing than a poor one with all that money can buy.

4. As much physics as is presented in, say, Norton's Elements of Physics should be required for admission to college.

5. Students ought not to begin the work in college, but should spend a year on Ganot's Physics; let non-classical students take another year for laboratory and mathematical physics.

6. With good teachers a course might be planned to satisfy the schools and colleges. I think the course described in answer to 3 and 4 is the common ground sought.

7. Physics should come in the sophomore year. So much as is indicated in 5 should be prescribed, with more electives offered. Students named under 5 (*b*) should take a brief laboratory course. Plane trigonometry should be a prerequisite for students in 5 (*b*) and 5 (*c*) and calculus for the second year of students in 5 (*c*).

8. Students who have received good instruction in elementary physics in childhood or early youth show more independence of thought in all college work, but especially in scientific branches. Students who come without such training have difficulty in breaking away from the habit of mere memorizing acquired in elementary language work and in mathematics as too commonly taught.

No disadvantages have been observed in my experience, unless perhaps so strong a liking for science work as to produce disinclination for literary studies can be considered a disadvantage.

9. As to question 1, create an interest in phenomena of nature, develop and fix habits of observation and logical habits of thought. In 3, the same extended with more complete information.

10. As our school systems are now managed, I regard general instruction impossible. First, because success premises in the teacher manual skill, combined with clearness and originality in teaching, which commands a price and a permanence not offered in common or high school work. Secondly, because the school authorities generally, as far as I have been able to observe, feel too poor to spend from $100 to $500 for the few pieces of apparatus without which even the best teacher would be much crippled. The first difficulty applies to all this country; the second, more particularly to the West and South.

(67) *Francis E. Nipher, professor of physics, Washington University, St. Louis, Mo.*

1. In lower schools it is desirable to introduce something like Cooley's Rudiments if the teacher is given large discretion and if there is proper adaptation to means ordinarily attainable. The object to be attained is to arouse interest and curiosity. Without books. This can hardly serve as a basis for future work; say a beginning of a basis.

2. I should say 200 hours should be given to physics in the high school if the teacher is capable; otherwise the less the better. It should come in the last year.

3. The work should be in part quantitative, but mostly qualitative; inductive and deductive; for both information and discipline, but the latter is more important; with text book; and laboratory work to some ex-

tent if the teacher is capable. Assume a knowledge of equations of the first degree and discussion of two variables. Probably $100 would be the cost of the apparatus. I would have it largely home made.

4. The amount of physics given in 2 should be required for admission to college.

5. Students who begin the study in college should have more quantitative and more mathematical work. (See answer to 9.)

6. The course described above will be likely to satisfy both schools and colleges.

7. The scientific students should take up physics in the first year and the classical students in the junior. It should be a prescribed study. Plane trigonometry should be a prerequisite, although not needed in the freshman scientific. In ordinary courses higher mathematics should not be required. Elementary laboratory work should be taken.

8. I have not found the requirement of physics of very great advantage, because it has not been done properly. It takes better teachers than we have in most schools to teach elementary physics well. There have been many wrong ideas imparted, and particularly so on the subject of forces and the force of gravity.

9 and 10. In the grammar school the main thing should be to awaken an interest in physics. It is not possible to do much more. So the work should be simple and in general qualitative. In the high school a little of quantitative work should be done in connection with "mechanical powers" or the pendulum, and a beginning should be made in the discussion of equations which are involved. Not much of this kind of work should be attempted, however.

In college I would make the scientific course involve more physics than the classical: for regular students taking ordinary courses, say, two years obligatory for scientific students (three times a week), and for classical half a year obligatory and another half year elective.

(68) *T. C. George, professor of natural science, University of the Pacific, San José, Cal.*

1. In lower schools introduce a sufficient amount of physics to treat of the elements of matter, force, light, heat, sound, and electricity; both with and without book. This can serve as a basis for future work.

2. In the high school I would not give less than a year of daily work (200 hours) except to avoid overworking the students. It should come either in the junior or senior year.

3. The work should be inductive and deductive; for both information and discipline; with text book; with laboratory work. Assume a knowledge of mathematics through trigonometry at least. The apparatus would cost about $1,000. Ritchie & Sons, Boston, give a good list for high school work at the close of their catalogue.

4. The equivalent of Avery's Elements of Natural Philosophy should be required for admission to college.

5. I require students who begin the work in college to prepare the amount given in 4. For others the instruction should be more experimental and extensive.

6. I think the course described in 3 and 4 will satisfy the schools and colleges.

7. Physics should be a prescribed study of the junior year. Plane trigonometry should be a prerequisite. No higher mathematics should be required. It would be better to have laboratory work.

8. I must confess that the knowledge students have obtained has been largely confined to definitions and seldom have they received the benefit of experiments which are absolutely needed to understand the subject. I find it difficult to have students take proper care of physical apparatus needed for experiments; so that even in our college work I am obliged to make the experiments largely myself or else appoint some one member of a club who will be responsible.

The disadvantages are incorrect ideas gathered from descriptions without experiments and a lack of attentive observation.

9. Physics should be taught in the preparatory school for the general information of the student, who needs to have his mind stored with facts which may serve as materials of thought.

10. My experience in public schools leads me to think too much is attempted to insure thoroughness. It would be better to require less and be master of a few things than to have a smattering of many.

I should be glad if you are able to secure reform in teaching physics, so that our text books shall be based more and more on experiment. I find a text book necessary, but there is too much attention paid to theories and too little to fact; as a rule it is difficult for the student to keep up the distinction between theory and fact.

IV. FROM OTHER WRITERS.

(69) *W. H. Payne, professor of the science and the art of teaching, University of Michigan, Ann Arbor, Mich.*

1. In lower schools I think it desirable to introduce instruction in physics, including the property of matter, mechanics, hydraulics, hydrostatics, and pneumatics, with a brief and clear text book. This can serve as a basis for future work.

2. One year of ordinary recitation work should be given to physics in the high school. It should come the third year.

3. The high school work should be instruction from a good text book, with illustrations; for information and discipline; with slight laboratory work. Assume a knowledge of plane geometry.

4. One year of physics should be required for admission to college.

5. The work by the students should be more independent.

6. The course described in answer to 3 and 4 is the common ground sought.

7. Physics should come in the first year of college.

10. As to method of study, my opinion is this, in brief: the pupil must derive the greater part of his knowledge at *second hand* as literature, and not at *first hand* from inductive research; and in estimating the *disciplinary* value of science it must be assumed that teacher and pupil do not stand on the same ground.

It is necessary to distinguish between the *absolute* and the *relative* values of subjects. The absolute value of science is incalculable, but it does not follow that science should be the staple of instruction. *Some* men must know all that can be learned about medicine, but the division of labor makes it unnecessary that *all* should study medicine. So in the sciences.

(70) *S. N. Fellows, chair of didactics, State University, Iowa City, Iowa.*

1. Very little physics should be introduced in lower schools. Give an oral lesson about once a week; without books. Certainly this can serve as a basis for future work.

2. In the high school give not over three lessons a week for a single year. It should come in the first or second year.

3. The work should be elementary; inductive and deductive; for information; with text book; with a little laboratory work. Assume a knowledge of arithmetic completed. The apparatus should be simple. I cannot estimate the cost.

4. For admission to college require only the elements of physics, as they may be taught in about twenty weeks. I would make no difference between the classical and non classical course.

5. Students who begin the work in college should give less time and put less emphasis on elementary facts. For others the instruction should include more principles.

6. The course described in answer to 3 and 4 will satisfy the schools and colleges.

7. Physics should be a prescribed study of the sophomore year. The laboratory work should accompany the other work only for specialists in science. Plane trigonometry should be a prerequisite for all; higher mathematics only for special courses.

9. Physics should be taught in the preparatory schools merely to give such general facts of physical science as can be mastered and utilized.

10. There should be an advanced elective course in physics for specialists, extending into the junior or senior year in college. Specialists in science need from the beginning more laboratory work, in order to be trained in careful observation, comparison, and generalization of facts. To them method is far more important than results, while the general student who will become a professional man needs less of laboratory work. He wants results simply to use in his profession.

(71) *Author unknown.*

1. In lower schools physics should be introduced incidentally only, and not as a new study. The work should consist of the observation and description of a few well chosen experiments.

2. There should be not less than 200 recitations in physics during the last year of the high school course.

3. The work should be purely experimental; inductive; for discipline; with text book; with laboratory work, if possible. The mathematical knowledge to be assumed should not be more than a complete course in arithmetic. The pieces of apparatus that have to be bought need not in all cost over $100, but the teacher should make a great deal himself.

5. For students who begin the work in college the instruction should be more strictly systematic, using mathematics largely.

6. The course described in answer to 3 should satisfy the schools and colleges.

7. Plane trigonometry should not be a prerequisite. The most frequent cause of non-success is the use of deductive methods before the students know how to observe and know any facts. Higher mathematics should not be required. Physics should be a prescribed study. Elementary laboratory work should accompany the other work.

8. Preparatory schools are commonly organized mainly or entirely with a view to meeting the requirements for admission. A requirement of physics is the only means there is of insuring to them at least one study that shall bring them in contact with the world that is. Yet there is a liability to overcrowding alongside with requirements in the classics that are very exacting.

9. In the preparatory schools the study should have for its main purpose the discipline of the faculty of observation and of reasoning from observation; also, to make the students acquainted with a number of scientific facts, leaving severe systematizing and deductive reasoning to a later stage.

10. There is a lack of understanding and coöperation between college professors and preparatory teachers on this subject. College professors frequently do not know what boys can do and what not. (See physics prescribed for Lawrence Scientific School.) The most frequent cause of failure is an attempt (often *forced* upon the preliminary schools) to master works that are quite extensive enough and difficult enough for a college course. There is a dearth of works mainly calculated for discipline of the mind.

(72) *J. B. Merwin, editor, American Journal of Education, St. Louis, Mo.*

I am unable to give any information of *exact* practical value further than the inclosed syllabus. [Dr. Harris's syllabus will be referred to later.]

CHAPTER III.

INFORMATION FROM OTHER SOURCES.

FRANCE.

In France, as is well known, the courses of study are regulated by decrees of the minister of public instruction.

In the *lycées* at present the plan of studies is that prescribed by decree of August 2, 1880. The following table will show the time given to the sciences in each year of the course by students seeking the degree of bachelor of letters. The term science includes here mathematics, but where it is possible the time given to science proper is indicated in the table. Including drawing, 24 hours of class work per week are prescribed.

Name of class.	Age.	No. hours for science.	Mathematics.	Scientific subjects.
			ELEMENTARY DIVISION.	
	Yrs.			
Preparatory	......	4	Numbers	Solids, water, air.
Eighth	9	4	Numbers, geometrical figures.	Plants and animals.
Seventh	10	4	Numbers, geometrical figures, metric system.	Stones, soil, water, rocks; first elements of experimental science, balance, fluids, meteorology.
			GRAMMAR DIVISION.	
Sixth	11	3	Arithmetic	Phys'cs (all parts) and chemistry, 1½ hours.
Fifth	12	4	Arithmetic, geometry	Zoölogy, 1 hour per week.
Fourth	13	3	Arithmetic, geometry	Geology and botany, 1 hour. (Greek begun.)
			UPPER DIVISION.	
Third	14	3	Arith., plane geom., algebra	Gravity, fluids, heat, 1 hour.
Second	15	3	Algebra, geometry	Acoustics, optics, 1 hour.
Rhetoric	16	3	Geometry, astronomy	Magnetism, electricity.
Philosophy	......	10	Review, &c., 4 hours	Review and completion of physics, chemistry, 3 hours; animal and vegetable physiology, 3 hours.

In the three classes, sixth, fifth, and fourth, the teaching of the physical and natural sciences is essentially descriptive and experimental. A long list is given of the models, specimens, and other apparatus for teaching in the elementary division.

In case the student wishes to fit himself for the special scientific schools or to take the degree of bachelor in science, he will join the class of preparatory mathematics, instead of the class of philosophy, the scientific studies of which are the same; then go on to the class of elementary mathematics. Here he has plane trigonometry, mechanics, and 4½ hours of physics, covering the whole subject. The syllabus of subjects in physics is the same as that in the program of examinations for the degree of bachelor of science; it has not been revised since 1865. The table of contents of Deschanel (omitting the English additions) gives a sufficiently accurate notion of the ground covered; the order of the five branches is also the same in both book and syllabus. Franck's collection of questions set for written work at these examinations will give a still more accurate view of the nature of the requirements in physics for this degree.

Candidates for the École Polytechnique and some other schools join the class of special mathematics and have five hours a week for physics. The treatment of the subject is experimental, and no mathematical developments may be required by the examiner.

In the *girls' schools*, by the decrees of January 14 and July 28, 1882, the number of hours per week given to exercises in science is as follows:

Year.	Minimum age.	Number of hours for science.	Scientific subject.
First	12–13	1	Zoölogy and botany.
Second.....	13–14	1	Zoölogy and geology.
Third......	14–15	3	Physics, elements of mechanics; chemistry, 1 hour in 2d semester.
Fourth	15–16	2	Physiology, 1 hour; heat and acoustics, 1 hour.
Fifth	16–17	2	Magnetism, electricity, optics, 1 hour; chemistry, 1 hour.

The *public primary schools* may have, by decree of July 27, 1882, three courses: an elementary (age 7 to 9), a middle (9 to 11), and a higher course (11 to 13), each occupying two years; but in the small schools these are combined or in part omitted. When there are teachers enough there may be added a supplementary one-year course, and also infant classes.

The aim is not to teach much, but to teach well. * * * The master starts always from what the children know, and, proceeding from the known to the unknown, from the easy to the difficult, he leads them by a logical succession of oral questions or written exercises, to discover the consequences of a principle, the applications of a rule, or inversely the principles and rules which they have already been applying unconsciously.

The instruction in science occupies about half an hour daily, or rather less than three hours per week, throughout the course. It starts with object lessons, according to a plan to be drawn up by the master and regularly followed. In the elementary course these are mainly on natural history. In the next course (nine to eleven years) a little of the time is

given to the simplest notions of the three states of matter, to the atmosphere, water, &c., with experiments. In the last two years natural history is reviewed and extended, and simple notions of physics are given, including facts under heat, light, and electricity. Simple illustrative collections are supplied by the state to the poorer schools.

GERMANY.

OFFICIAL PROGRAMS.

The Gymnasien, &c.—The plans of study in the Prussian higher schools have recently been thoroughly revised. From the circular of the minister of spiritual, educational, and medical affairs of March 31, 1882, and from a number of school reports, mostly from Berlin, the following facts and extracts are taken. It should be premised that students entering any of the four higher schools are at least nine years old, have had about three years' training in a Vorschule or elsewhere, and begin at once on Latin or French.

In the *Gymnasien* two hours a week are devoted to science from the Sexta through the nine years' course; in all, eighteen hours; formerly only fourteen hours. Physics (including chemistry) occupies the last four years. The time given to this branch is therefore equivalent to eight hours a week for one year; formerly it was but six hours. Compare Table II, page 158.

In the *Realgymnasien* (which do not teach Greek and give only two-thirds as much time to Latin as is given by the Gymnasien) two hours a week are given to natural history through the first six years, three to physics during the last four years, and two to chemistry during the last three years, a total of thirty hours, instead of thirty-four under the previous regulations. The reasons for the change will be given later.

In the *Oberrealschulen* (having neither Greek nor Latin) natural history receives one hour more, physics two hours more, and chemistry three hours more than in the Realgymnasien, a total, respectively, of thirteen, fourteen, and nine hours, or, in all, thirty-six hours.

In the higher *Bürgerschulen*, which have only a six-year course, natural history has thirteen hours, and in the last two years physics and chemistry together eight hours.

The usual number of school hours in all these schools is thirty per week; less in the Sexta; more where there is much drawing. The instruction in science in the Gymnasien under the plan of 1856 did not prove satisfactory, because it was interrupted in the Quarta and the schools were allowed to omit it, if desired, in the Sexta and Quinta. Further, in the Secunda only one hour a week was given to the study of physics. The result of this neglect was far less injurious to those who were to take up scientific studies later than to those who would have no opportunities to fill up these gaps in their training. To gain time in the Quarta for science, and so to keep up the continuity of scientific training, as well as for other reasons stated in the circular, the study of

Greek will hereafter begin a year later, that is, in the Untertertia. Similarly in other schools than the Gymnasien English is begun in the tertia.

The changes in the course of study in the Realgymnasien and in the nature of the examinations prescribed by the circular of May 27, 1882, are such as to lay more stress on the linguistic side of the training than before; the time devoted to natural history is diminished and the study terminates earlier in the course than formerly, as it was found scarcely possible to avoid going into theoretical parts of the subject which should be left to the higher schools.

With regard to each study, we learn that natural history includes botany, zoölogy, human anatomy, and mineralogy; the minuter details are left to each school to settle; so some programs include geology. Under the head of physics the student should acquire "a knowledge of the most important phenomena and laws in the various branches of physics, as well as the simplest principles of chemistry." "Those branches of physics which preëminently allow of experimental treatment (electricity, magnetism, heat) belong to the Secunda, and also a short course in chemistry. In the Prima the mathematical foundation of the laws is added in the study of mechanics, optics, and mathematical geography, so far as the student's knowledge allows." Plain trigonometry comes, at least in some of the Gymnasien, as early as the Obersecunda.

In the Realgymnasien and Oberrealschulen somewhat more stress is laid on the mathematical laws of physics. Analytical geometry and the differential calculus may be taught in these schools, but are not required. "Besides the fact that the laws of physics form the basis for chemistry, the former study offers, through its greater range and the greater variety of its subject matter and through its better established theoretical basis, by means of which it is brought into more intimate connection with mathematics, a much richer material for instruction and a more many-sided stimulus for intellectual training than chemistry." There follows a page of discriminating discussion of the advantages and danger of using chemistry as a means of training. Laboratory work is advised for those who can profit by it; those who would make a play spell of it should not be required to take it.

In the higher Bürgerschulen the instruction in physics and chemistry must be elementary and experimental, without mathematical treatment; only the simplest phenomena and laws can be treated, especially in optics and acoustics, which are the most difficult parts.

It may be of interest to give more in detail the arrangement of the work in physics in one of the schools. We take the Dorotheenstädtisches Realgymnasium of Berlin, the director of which is Dr. Schwalbe, well known as one of the editors of Die Fortschritte der Physik. The work occupies three hours a week for four years, as already stated; here, as in most of the Berlin schools which use a text book at all, Jochmann's

Grundriss der Experimentalphysik is used, though his order of topics is not always followed. In the first year, Untersecunda, when the students are about fifteen years old, they begin with the general properties of bodies, molecular physics, and the most important parts of experimental mechanics. In the Obersecunda they take up, in summer, frictional electricity and magnetism and parts of meteorology; in winter, heat. In the Unterprima, in summer, acoustics, theory of waves, and general optics; in winter, optics and radiant heat. In the Oberprima, in summer, galvanic electricity and induction; in winter, mechanics and some chapters on terrestrial physics. Through the whole course there are reviews, expansions of previous chapters, and solutions of problems, one hour weekly; and every month a written exercise in all classes. Trigonometry was studied at the beginning of the Untersecunda.

As the programs, or school reports, contain lists of newly acquired apparatus, it is easy to judge that the outfit of apparatus is very much such as would be found in some scores of the better American high schools; say from three hundred to five hundred dollars' worth, as a very rough estimate.

In the other states of Germany somewhat less time is given to the sciences than in Prussia; the programs at hand add nothing of special importance to what has been said already. But it may be of interest to condense some tables published by Uhlig and based on the latest authorities up to October, 1883. The unit of time is one hour a week for a year.

State.	Gymnasien.		Realgymnasien.			Realschulen.[1]		
	Nat. hist.	Physics.	Nat. hist.	Physics.	Chem.	Nat. hist.	Physics.	Chem.
Prussia	10	8	12	12	6	13	14	9
Bavaria	....	3	4	6	5	6	6	6
Württemberg	7	2	10–11	5–6	3	10	(8½)	
Saxony	9	7	12	10	8	....	....	....
Baden	10	8	10	8	4	8	7	4
Hesse	(18)		....	....	....	8	6	6
Oldenburg	6	8	....	....	....	....	....	....
Saxe-Weimar	10	8	....	....	....	....	....	....
Alsace-Lorraine	(14)		....	....	....	11	(12)	

[1] These have courses of nine years in Prussia and Württemberg, seven years in Alsace-Lorraine, and six years in the other states.

The Volksschulen.—The schools so far spoken of are those attended by the children of the higher classes socially, the fees ranging from $20 to $35 a year. The poorer children attend the Volksschulen from their sixth to their fourteenth year, where the fees are low; in Barmen, Prussia, 6 Mark ($1.43) a year. (See Report of the Commissioner of Education for 1881, p. ccxlviii–ccxlix.) For these schools the best source of information at hand is found in the following book:

Schmid's Pädagogisches Handbuch contains an admirable, well rounded discussion of the question of physics in the Volksschulen and allied training schools.

In sixteen large pages, the writer, Oberlehrer Maier, discusses the necessity of introducing the subject into these schools, the selection of topics, the methods of instruction, mistakes in instruction, experimenting, use of drawings, books, reviews, &c. The following points are taken from this article, some of them being considerably condensed. Everything is to be excluded that cannot be made clear by experiment or by reference to familiar phenomena; to be excluded also are those experiments that serve only for entertainment or to excite curiosity, and what belongs exclusively to a definite trade, or is uncertain. All branches of physics must be treated; we cannot say this chapter has more interest or more value than that. But in each those parts are to be selected that the child is most familiar with in his plays, in home life, or in the operations of nature. There follows a list of the principal points under each branch of physics to be taken up in the Volksschule, with references to the corresponding articles in The Reading Book for the Evangelical Schools of Württemberg. The order of these branches is immaterial; one teacher may begin with magnetism, another with heat.

In the instruction, care must be taken to avoid both too great and too little use of mathematics and both too frequent and too few references to the religious bearings of the subject. The instruction must be illustrative (anschaulich). "Experiment is needed not only because ordinary phenomena do not suffice, but to understand these very phenomena. Experiment in the school is the bridge over which the pupils with their thoughts are to go and which is to connect the school instruction and the natural phenomena." Pictures may supplement experiment, not replace it.

Neither a lecture merely, nor the purely catechetical form of teaching, is suitable. In questioning, "the physical processes, to be sure, are taken in part from the child's range of observation, but we have besides to deal with unknown forces and processes, of which the child knows little or nothing and of which he can give no account on questioning. Nature is still to the child a foreign book, and he is to acquire the ability to read in it by the instruction he receives. The most suitable kind of teaching is the developing kind. The teacher directs his pupil's attention to the physical phenomenon; he can ask questions in connection with it; he guides him to accurate observation; he lets the child account for what he has been looking at, lets him recount similar familiar phenomena, and can even bring him so far by drawing conclusions that the law is discovered by the child himself."

To fix the matter, reviews are serviceable, and written exercises.

The order should not be the same as at the first, but the topics assigned should suggest new points of view, comparisons, &c.; as, compare the barometer and thermometer.

In Württemberg, Prussia, and many other states, it is found that a text book is of no use for children from ten to fourteen years old, and not for older pupils, unless they are to enjoy instruction for some years.

In the Württemberg one-class Volksschule, physics comes in the fourth and sixth years; about forty-four hours in all are devoted to direct instruction, and the same time to written work. In the higher grades of schools more time is given to the subject and a more systematic order of study is followed.

With regard to apparatus for the grade of schools here considered, in Württemberg Professor Bopp's small collection is in use under official sanction; it is made by Spindler, of Stuttgart, numbers 28 to 30 pieces, and costs 20 Mark ($5), but is hardly satisfactory. In Saxony the collection for elementary schools made by Hering, in Reichenbach, at the same price, is the one recommended.

A long, critical list of books follows; these two may be of use to American teachers: "Bänitz, Dr.: Physik für Volksschulen. Fifth edition. One of the best little books of this sort; the matter is systematically arranged, divided into steps, based only on experiment, and proceeds from experiment to phenomena and to the law. Ule: Warum und Weil. Physics presented in questions and answers for the use of teachers. Fourth edition. Suitable for reviews."

Lindner's Encyclopädisches Handbuch der Erziehungskunde (third unchanged edition, Vienna, 1884) contains, under the title "Physik," some further discussion of some of the points connected with physics teaching.

Diesterweg's Wegweiser zur Bildung für deutsche Lehrer is a well known classical book on pedagogy, dating from 1835. In 1877 the fifth edition was published in three volumes, with additions and book notices by various writers. In the chapter on physics the same views are presented as to the methods of teaching the subject that are advocated by almost all writers. "First, What? then, How? then, Why? or, Phenomena, Law, Cause. The law is usually the unit for a multitude of phenomena; the cause (force) is the unit for a multitude of laws." Heussi, in his three text books, had carried to an extreme this method, the first dealing only with phenomena, the second with laws, and the third with causes. But, in spite of the originality and excellence of the books, Diesterweg agrees with the majority of writers in the educational journals that such a separation is "unpsychological," and "neither can nor should be carried out." "Thorough scientific knowledge is a matter for maturer years; but always observation, understanding, and explanation belong together." In the fifth edition the editor of this chapter, F. Langhoff, calls attention to one point not often noticed with clearness, viz: A *large part of* the school work—in fact, its "centre of gravity"—lies in

the knowledge of the construction and use of physical instruments, such as "the familiar optical ones, plane and curved mirrors, prisms, the spectroscope, lenses, spectacles, the magic lantern, camera obscura, microscope, and telescope," and this knowledge is not necessarily included under any of the three familiar heads just named; so the common classification is not quite complete and exhaustive for the purposes of instruction.

SWITZERLAND.

Collections of apparatus.—In the National Swiss Exhibition at Zürich, 1883, there was a fine educational exhibit, including collections of apparatus. From the catalogue we may learn the cost of the physical apparatus prescribed by the cantonal authorities in some of the cantons.

In the canton of Zürich the obligatory apparatus for physics and chemistry in the intermediate schools (Ergänzungsschulen) costs about 125 francs, covering the five branches of the subject. For the secondary schools Wettstein's wall charts and 550 francs' worth of apparatus for physics are obligatory, and a further list of 1,000 francs is recommended.

For the canton of Bern the cost is stated without giving the items: 7 pieces of physical apparatus for primary schools, 19 francs; 50 pieces for secondary schools, 842 francs. Other cantons give lists, but without prices.

Methods of teaching.—Of these, we may learn something from an address on natural science in secondary schools by F. Mühlberg before teachers of the canton Vaud, translated and published as a bulletin by Commissioner Eaton in 1882:

There are two leading views of the object of teaching natural sciences, one of long standing and the other of more recent growth. According to the former, the aim of such teaching is to furnish material knowledge and give the student a certain amount of practical training for making that knowledge effective in business affairs. The later idea is to supply a general intellectual training, so as to fit students to acquire knowledge for themselves. As in practical life ability to acquire is preferable to simple possession, so in intellectual matters the same preference exists, but in a greater degree. * * * Moreover, if the only point were to impart to young students a definite amount of useful information committed to memory, it would be better to furnish them at once with books of reference, which are more reliable than memory and which would also cost the State less than the employment of teachers. Besides, the memory is so much exercised in other ways, and other departments of instruction make such heavy demands upon it, that it ought not to be too heavily burdened by an additional amount of scientific study in which an effort is made to learn a variety of things, names, and classifications that only arouse curiosity for the moment and soon deaden intellectual activity. Of course one gets on faster with a child by carrying it, but it is for the child's interest to teach it to run and to swim by itself. In the same way it is better not to give young scholars scientific knowledge ready made, but to teach them the way to it. By imparting to them results obtained by others the ideal purpose of instruction is seriously prejudiced, the sense of scientifically accurate thinking is destroyed, the belief in authority is increased instead of checked, and the mind becomes surfeited instead of finding pleasure in the exercise of its powers. This partly explains why high school teachers often prefer those of their scholars who

have received no scientific education to those who have received an ill taught smattering of it. * * *

In the instruction the first thing necessary is practice in observing, and in the use of all the senses for that purpose. * * * Not every one who can see sees carefully and accurately. * * *

Hand in hand with observation goes discipline in describing the things observed. One single observation accurately made is of more value than a thousand anecdotes and illustrations, with which many teachers believe they ought to enliven their instruction. It is not the teacher, however, but the scholar, who ought to make the description of the things under observation, that is, the things he has himself observed, not the things with which he has burdened his memory without observation. Accurate description (with drawings, if possible) serves as a check upon the inaccuracy of the observations, and besides gives students a correct comprehension of words with which they are already familiar, or by leading them to look up new terms enriches their vocabulary and develops a versatility in the use of language, particularly if the teacher is strict in limiting them to the use of general terms. Practice in giving definitions should be undertaken at the same time. * * *

Instruction in natural science should also be a training in thinking. Pupils should be led to form general ideas or laws from the objects of study and the phenomena presented to them, to draw conclusions upon the causes of such phenomena, and predict the future action of the causes they have learned to know. In this way not only a knowledge but an understanding of nature is reached. * * *

The teacher of natural science ought to have the necessary special scientific schooling for that purpose. In no department of instruction is it less permissible to teach authoritatively than in this, and to make it a subordinate branch for a teacher not specially prepared for it is often worse than to provide no scientific instruction whatever; for the teacher must not only be master of the material he teaches, but ought also to be a model of the intellectual training he tries to impart; he should have the capacity to observe, describe, and reason accurately about the material of study. * * * One of the commonest faults of teachers is that, in order to get on with their pupils as fast as possible, they themselves describe the objects or phenomena under consideration and derive laws from them, instead of allowing the scholars to do so. * * * A science teacher should be able to show his pupils how to give graphic reproductions of what they have learned. Whatever drawing might be necessary for this purpose should not, however, be presented ready made to scholars, but should be drawn by the teacher on the large scale on the slate or board before their eyes. * * *

The natural science school book should be used only as a book of reference in reviewing, as a means of saving writing, for recalling to memory the things observed in the course of study, as a help in looking up modes of expression, and particularly as a general model. It should remain closed while teaching is going on. It ought, above all, to be in every respect up to the times in its subject matter, and, while being as brief as possible, it should afford an accurate and complete selection of topics. It would be a great mistake if the school book were made a transcript of the course of teaching. It ought, therefore, to have a systematic and not a methodical arrangement, so that at the end of the course it would serve as a general summary of the observations and inductions made by the scholars. It is indispensable for scholars to prepare their own descriptions and drawings and work up their notes in the form of small treatises or dissertations, notwithstanding a simultaneous use of the school book.

Methods of instruction are generally faulty in aiming at a practical training for some business career at a stage where a general training of the mind is the first essential, and in attributing too much weight to systematic instruction.

ENGLAND.

I. OFFICIAL PAPERS.

In England we find no circulars or decrees of universal application as on the Continent. The agencies responsible for the place of science in education are so many, so different in character and aims, and so changeable that a comprehensive view even of what is wanted for the present purpose seems scarcely possible, and a brief one would be impossible. It is only to a small extent, and indirectly, that any authority prescribes what is to be taught in science or how it shall be taught; but the authorities announce what kind of examinations they will give and what return shall be made for passing them: to the pupil, as a prize, scholarship, admission to higher studies, degree, diploma as teacher, &c.; to the teacher, for payment on results; to the school board, in partial payment of the expenses of the school.

The education code.—The body exercising the largest authority is the Committee of Council on Education, which administers the parliamentary grant of over 2,000,000*l.* for elementary education. In the school year 1881–'82 over 18,000 schools were inspected, in which over 4,000,000 scholars were enrolled.

In the code of minutes of the education department (1883) seven standards of examination are laid down; these cover only the "three R's" and are intended for children from six to thirteen years of age; there will be very few in these schools above fourteen. But any school may introduce any of certain "class subjects," for which special payment is made by the department, if the class appears to have been well taught, and any of a dozen "specific subjects," for which payment is made only on account of those students who pass an individual examination. If any class subjects are taught, English must be one of them; next, geography or elementary science may be chosen, or in the higher standards (Standards V–VII) history may be taught.

The details of the course in elementary science are given in Schedule II. It consists of "a progressive course of simple lessons * * * adapted to cultivate habits of exact observation, statement, and reasoning." The pupils of the different years need not be kept distinct, two divisions for the whole school being sufficient. "The class subjects should be taught by means of reading books and oral lessons, illustrated so far as possible by maps, diagrams, specimens, and simple experiments," the first division learning about "common objects, such as familiar animals, plants, and substances employed in ordinary life." The second division, beginning with Standard IV or V (say eleven years of age), passes to "a more advanced knowledge of special groups of common objects, such as: (*a*) Animals or plants * * *; (*b*) substances employed in arts and manufactures; (*c*) the simpler kinds of physical and mechanical appliances, e. g., the thermometer, barometer, lever, pulley, wheel and axle, spirit level." In later years

this course develops into (*b*) "the chemical and physical principles involved in one of the chief industries of England, among which agriculture may be reckoned; (*c*) the physical and mechanical principles involved in the construction of the commoner instruments and of the simpler forms of industrial machinery." Other schemes of study in elementary science may be followed, if approved in advance. If the examiner's report on the examination of the class is "fair" or "good," a grant of 1*l.* or 2*l.* is made for each member of the class.

The provisions for these "class subjects" have been very considerably modified and developed since scientific studies were first introduced among them in 1881. But so far as reported (up to August, 1882) the effect on scientific instruction was insignificant.

The "specific subjects" named in Schedule IV may not be taken up by any student till after Standard IV is completed, and then only two of them in any one year: the grant is 4 shillings for each scholar passing the individual examination. Three stages are provided for each subject, but these may be taken in any order desired when the subject admits of it. It is intended that the science-subjects in the table shall be taught mainly by experiment and illustration; if "taught to children by definition and verbal description, instead of by making them exercise their own powers of observation, they will be worthless as a means of education." The school inspectors must find out the ideas which the children have formed. The portions of Schedule IV relating to physical subjects are given here in full.

SCHEDULE IV.—*Extract from the table of specific subjects of secular instruction.*

Stage.	8. Mechanics. Alternative schemes. A.	B.	Physics. 10. Sound, light, and heat.	11. Electricity and magnetism.
First	Matter in three states: solids, liquids, and gases. The mechanical properties peculiar to each state. Matter is porous, compressible, elastic. Measurement as practised by the mechanic. Measures of length, time, velocity, and space.	*Bodies at rest.*—Definitions. Parallelogram of forces. Centre of gravity. Mechanical powers.	The three modes in which heat may be conveyed from place to place. Effects of heat on solids, liquids, and gases. Expansion by heat. The thermometer. Latent heat. Elementary notions of specific heat. Heat produced by mechanical, chemical, and vital action.	Attraction, repulsion, and polarity as illustrated by the magnet. Terrestrial magnetism and the mariner's compass.
Second	Matter in motion. The weight of a body, its inertia and momentum. Measures of force, work, and energy. Energy may be transferred but cannot be destroyed. Heat as a form of energy.	*Matter in motion.*—Definitions. Laws of motion. Parallelogram of velocities. Direct impact of two spheres.	Sources and propagation of light. Intensity, shadows, shadow photometer. Reflection, mirrors. Refraction, lenses. Elementary explanation of the microscope, camera obscura, and magic lantern. Dispersion, prisms. The rainbow. Reflecting and refracting telescopes.	Attraction of light bodies by rubbed sealing wax and glass. Experimental proof that there are two forms of electricity. Attraction and repulsion. Gold-leaf electroscope. Construction of electrophorus, electrical machine, and Leyden jar. Explanation of atmospheric electricity.
Third	The simple mechanical powers, viz: (1) The lever; (2) the wheel and axle; (3) pulleys; (4) the inclined plane; (5) the wedge; (6) the screw. Liquid pressure; the hydrostatic press; liquids under the action of gravity. The parallelogram of velocities. The parallelogram of forces. Examples commonly met with illustrating the mechanical powers. N. B.—Instruction in this subject should be purely descriptive and experimental.	*Fluids.*—Definitions. Law of equilibrium of floating bodies. Hydrostatic press. Boyle's law. Air pump. Common pump. Barometer.	Propagation of sound. Elementary notions of vibrations and waves. Reflection of sound, echoes. Musical notes, simple instruments. Simple explanation of beats and nodes.	Voltaic or chemical electricity. The voltaic battery and notions of a current. Chemical effect of a current. Electrolysis. Magnetic effect of a current. Galvanometer. Induced currents. Electro-magnets. The electric telegraph.

These specific subjects have been much extended in the latest code. Mechanics, A, was the only one of the four above given which was named in former codes. In the year 1881–'82, 2,548 children were ex-

amined in the first stage, 1,003 in the second stage, and 382 in the third stage—a small number from the 18,000 schools inspected. But the quite uniform testimony of the 24 inspectors who refer to the subject at all is against the teaching of this subject in these schools; it should be left for higher schools, unless, perhaps, in the large cities. In fact, the instructions to the inspectors under the latest code say:

If the [class] subjects are simply and thoroughly taught, the scholars will form those habits of exact observation, reasoning, and statement which are needed for the intelligent conduct of life. In ordinary circumstances the scheme of elementary education as now laid down by the code may be considered complete without the addition of specific subjects. (§ 26.)

In some schools, as those of the London school board, systematized object lessons have been introduced, and Dr. J. H. Gladstone, of this board, has recently published a lecture on object teaching.

The Science and Art Department.—The most conspicuous agency in science teaching in England at present is the Science and Art Department of the Committee of Council on Education. The early history of the department is told in the Second Report of the Royal Commission on Scientific Instruction, p. xix, and in Becker's Scientific London, as well as in the last report of the department. Established in 1853, it has greatly and rapidly extended its influence and "given a remarkable impulse to scientific education throughout the United Kingdom." The large sum of money put at the disposal of the department annually by Parliament is expended in prizes and medals to students passing public examinations, "in payments to teachers on the results of these examinations, scholarships and exhibitions, building grants, and grants towards the purchase of fittings, apparatus," &c. The teachers receive payment on the results of the May examination on account of the instruction of students of the industrial classes or of their children. The payments are 2*l.* for a first class and 1*l.* for a second class in the elementary and advanced stages, and double these amounts for the honors examination. These payments and the prizes amount to about 50,000*l.* In 1880, 69,187 papers were worked. The teacher must have given at least 28 lessons to the class and each student must have received 20 lessons at least. The subjects on which examination papers are set are 24 in number, three of them, as metallurgy, being divided into two parts, theoretical and practical. From the Directory of the department, revised to August, 1882, a description of the work under some of the subjects is taken:

VI. Theoretical mechanics, including hydrostatics and pneumatics. Examiner, Rev. J. F. Twisden, M.A.

VIII. Sound, light, and heat. Examiners, W. G. Adams, F.R.S., A. W. Reinold, M.A.

IX. Electricity and magnetism. Examiners, F. Guthrie, F.R.S., G. Cary Foster, F.R.S.

The list of topics given under each of these subjects covers a couple of pages, and would hardly repay quotation here. But it may be useful

to give the "general remarks concerning the object and method of teaching Subjects VIII and XI":

The teacher of this subject should always bear in mind that the object to be aimed at is quite as much to train his pupils in habits of exact reasoning and in the clear description of phenomena perceived through their own senses as to store their minds with information, however important from either a scientific or a practical point of view.

In order to attain this object it is essential that the pupils should witness the phenomena with respect to which they are to be instructed, as well as the chief experiments by which their nature can be elucidated. Also, as far as is at all practicable, the pupils should be allowed to handle the instruments and apparatus employed and to make experiments with them, and they should be shown how to construct the simpler kinds of apparatus for themselves.

The pupils should be exercised in the exact description of what they see in language as little technical as possible. It should be borne in mind that the proper use of technical terms is only to facilitate and shorten the expression of the results of observation.

The pupils should be encouraged to take brief notes during the lesson, and to write them out in their own language as soon afterwards as possible. Such notes, after revision by the teacher, should form the pupil's text book.

The teacher himself, being a sufficient master of his subject, will probably in most cases find it preferable to give the instruction entirely in his own language, which he can adapt to the knowledge and intelligence of his class, rather than to rely upon printed text books.

By this means there is less risk of the pupils falling into the injurious habit of using at second hand phrases which have to them little real meaning, a habit which unjustly sometimes suggests collusion or other unfairness and is always a proof of cram.

For Subject IX it is pointed out that the examination in the elementary course calls for a qualitative knowledge of the subject, the second for a quantitative, and that for honors assumes a knowledge of the absolute methods of measuring magnetic and electrical quantities.

So far as the writer can judge from the syllabus published, the grade of work required to pass the first stage, or elementary course, is a little below that of our best high schools; the second stage would scarcely be passed completely by American college students who have not done considerable elective work. The honors paper in electricity and magnetism last year was severely denounced by one of the English electrical journals for its severity. But it should be added that usually the student is allowed to try only a half or two-thirds of the questions, except for honors, in which case little liberty is given.

The following statistics from the thirtieth report of the department show the number of students and classes in some subjects and how far these examinations are employed at the training colleges for teachers (pp. 72, 76, 209):

	Subject VI.		Subject VIII.		Subject IX.	
	Theoretical mechanics.		Sound, light, and heat.		Magnetism and electricity.	
	Advanced.	Elementary.	Advanced.	Elementary.	Advanced.	Elementary.
Number of students examined:						
1881	211	1,821	678	3,412	1,715	[illegible]
1882	216	1,616	831	3,655	1,608	[illegible]
Number of students passed:						
1881	121	1,063	464	2,296	1,324	[illegible]
1882	122	1,049	665	2,293	891	7,298
Number of students and classes at the beginning of 1882:						
Students	2,768		3,653		15,828	
Classes	136		273		554	
In the 39 training colleges, passed, 1882	None ...	None ...	1st class. 19	2d class. 363	1st class. 139	2d class. 471

This department further provides for the training of teachers in science at the Normal School of Science, South Kensington, London (reorganized in 1881), by lectures and laboratory work, by long and by short courses; it makes up and circulates collections of apparatus or natural history specimens, and has charge of the great South Kensington Museum, in which there is a large and interesting collection of physical apparatus.

It will be seen that one great service that this department is doing to the cause of scientific education consists in giving some degree of unity to the labors of science teachers all over the land, so that each one shall no longer be compelled to be a law to himself. This unifying of the work seems so important for us in the United States that considerable space has here been given to detailing the methods of this large organization. At the same time we must not overlook the great danger which is inherent in any mere examination system and which has been realized in this system, that of "cramming." (See criticisms by Joseph Payne, Lectures on Science and Art of Education, pp. 197 et seq., and testimony from examiners quoted on pp. 203–205.)

II. EXAMINING AND TEACHING BODIES.

Local examinations.—Of a very different class, since the distribution of public funds does not depend on them, are the local examinations held by various organizations all over England. The first body to establish them was the College of Preceptors in 1854. Their higher certificates have a definite value as "guarantees of a good general education," and consequently procure exemption from the preliminary literary ex-

aminations of students taking up law or medicine, &c. The obligatory subjects for a "first class" or "higher commercial" include at least one foreign language and ordinary English studies, the maximum number of marks being 200 for each study. Among the optional subjects are mechanics (200 marks) and experimental physics: (1) acoustics, (2) light, (3) heat, (4) electricity and magnetism (100 marks for each). Among the examiners for these sciences are Professors Foster, Atkinson, and Lodge, and Messrs. Magnus, Wormell, and Barrett. The candidate must obtain at least 600 marks on the whole examination. The questions of past examinations, published annually in the calendar, would prove very suggestive to American teachers. In the year 1883 about 14,000 entered for these examinations, of whom about 7,500 passed.

Two years later the Society of Arts instituted local examinations, but no details of them are at hand.

In 1858 the University of Cambridge, and later Oxford, established local examinations. Briefly, the details of the former are as follows:

They are conducted by printed papers worked in the presence of examiners sent from the university. The candidates are either juniors under sixteen years of age or seniors under eighteen. Passing this examination procures for senior candidates exemption from the "previous examination" at Cambridge. Candidates are examined in some English studies and in some of eight sections of studies, one of which includes natural philosophy and natural history. In December, 1882, 4,574 boys and 3,066 girls entered for the examination. In 1882, 2,173 students entered the Oxford examinations.

The Oxford and Cambridge schools examination board, formed in 1873, conducts examinations at schools. So far as the influence on the study of science is concerned it appears to be similar to that of the Cambridge local examinations.

The Scotch universities have similar arrangements, and some 1,800 students entered the examinations in the summer of 1883.

Holders of certificates from any of these examinations for seniors, if they are women over eighteen, are recognized as fitted for assistant teachers by the code of March 6, 1882.

The University of London matriculation examinations are similar, but higher than those described above. (See further, under the title "The English universities.")

So much for the principal examining bodies. Their direct influence in stimulating the study of physics is not so great as we might expect, because in all of them physics (and a part of it only) is but one of a number of optional subjects. None of these bodies has gone so far as to require some knowledge of physics on the part of *all* candidates.

The English universities.—Turn now to the universities. Oxford and Cambridge have made liberal provision for advanced scientific instruction, but the present inquiry is concerned rather with the scientific training of the majority than of the few.

At the University of Cambridge the plan of examination for the ordinary B. A. degree includes—

(1) "The previous examination," open to all students in their first or any later term of residence. This does not involve any science nor any higher mathematics than easy equations of the second degree in algebra.

(2) "The general examination," open to all students who have entered on their fifth term and have passed their previous examination. This involves "easy problems in algebra, elementary statics, elementary hydrostatics, and heat."

(3) "A special examination" in any one of seven subjects, open to all students who have entered on their ninth term. Of these seven, the examination in natural science involves a little heat under the head of chemistry; that in mechanism and applied science involves mechanics and heat, electricity and magnetism being optional; that in music involves acoustics.

But those who are candidates for honors need not take the examinations 2 and 3. All of these students have as additional subjects to the previous examination algebra, trigonometry, and elementary mechanics. After keeping at least seven terms they may be candidates for honors in the examination for any tripos. The natural science tripos examination includes physics and seven other sciences. This was passed by about forty candidates in 1882–'83. The mathematical tripos examination requires a very thorough course of mathematical physics, and is passed by about 100 candidates yearly. Further than this no knowledge of physics is required of any students except of candidates for the degree of doctor in medicine or science.

"Oxford does not require science for ordinary B. A., unless some change has occurred since the date of our latest official information, 1882.

"The University of London [it will be remembered that this is not a teaching body] matriculation examination includes elements of natural philosophy and elements of chemistry. As the university grants the two degrees B. A. and B. S., science is not required in the ordinary B. A. examination." (Communicated by Commissioner Eaton.)

Secondary schools.—Besides the teaching or examining bodies already considered, there are the great public schools of England, whose work lies especially in preparing students for the universities: Eton, Harrow, Rugby, &c. For many years they found it virtually impossible to introduce science, because the universities took no account of it, and it was felt that students who devoted much time to other studies than those named in the schemes for examination at the universities would be at a disadvantage in the many competitions open to them. The English boy apparently must make his education, even in its lower stages, pay him and his teachers in money or fame, or both. The organization of these schools is so varied, the naming of classes so different, and the information at hand so incomplete, that only a little space need be de-

voted to them. Among the science masters are some men of great activity and clearness of mind, whose articles in educational journals and elsewhere are very suggestive. Especial attention is paid in these schools to physical geography (physiography, as Huxley calls it), and the study seems to be a more valuable one than the one we know by the same name. A course in physics, like that of our high schools, covering all five subjects, is certainly not usual.

By the kindness of Rev. E. Hale, of Eton College, the writer has received a number of printed examination papers in science used there during the last few years. Some of them are for prizes, others the ordinary class papers. The average age of the class in mechanics is stated as 15; in heat, as 16 years. The questions seem unusually sensible—practical, one would say, if this word were not so ambiguous. Many of them relate to common matters of life, showing that the vitality of the work has not been sacrificed to memory work. They appear to show a somewhat narrower range of topics than is usually found in our best text books and high schools, but indicate greater thoroughness and assume more ability in applying the principles.

III. WORK OF THE ROYAL COMMISSION ON SCIENTIFIC INSTRUCTION.

In looking over the account of what has been done in the way of introducing scientific studies into elementary and secondary education in England one is surprised at the small result of the great agitation on the subject. But from the reports of this agitation some things of real value for us may be gleaned, and some of the papers written we cannot afford to overlook.

The government has been active in collecting facts and opinions from those competent to give them and a number of commissions have made recommendations on the subject. In 1861 the royal public schools commission was appointed and in 1864 the royal schools inquiry commission. Special commissioners were appointed for the purposes of the public schools act of 1868 and others for the purposes of the endowed schools act of 1869. All of these bodies urged the introduction of scientific studies into courses of instruction and some of the bodies were able to require their introduction into certain schools.

Reports of the commission.—In May, 1870, the Queen appointed a Royal Commission on Scientific Instruction and the Advancement of Science. The Duke of Devonshire (now and for over twenty years the chancellor of the University of Cambridge) was the chairman and in the list of members are the names of J. P. Kay-Shuttleworth, B. Samuelson, G. G. Stokes, and T. H. Huxley; the secretary was J. Norman Lockyer. This commission has published a thousand pages of testimony from teachers and men of science and eight reports, with appendixes and indexes, the last volume appearing in 1875. From their various reports the following paragraphs are extracted.

The second report takes strong ground in favor of scientific instruction in elementary schools by well arranged and methodized object lessons (p. xvi).

In the fourth report the commissioners say they are convinced that—

No real advancement of knowledge and none of the higher benefits from science as educational discipline are to be hoped for from merely general and occasional scientific instruction, whether it be derived from books or from lectures, but that such advancement and benefits will result only from systematic and sustained study. (Fourth report, p. 22.)

The sixth report deals with the teaching of science in the public and endowed schools and gives in appendixes very full accounts of the organization of many of these schools and their experience with science teaching:

The neglect of recommendations of so weighty and authoritative a character [as those made by the previous commissions] should imply the existence of strong grounds of excuse. The chief of those given for the omission of the teaching of science in schools are (1) the absence of funds; (2) the uncertainty as to the educational value of science, particularly in the case of young pupils; (3) the difficulty of finding time for a new study in an already overcrowded curriculum. (Page 4.)

With regard to the second objection, it is obvious that all branches of science do not possess an educational value of the same kind; and we are not prepared to assert that the mere communication to the mind of the pupil of the facts of science would contribute very materially to the training of his intellectual powers, although it may supply him with much valuable information, and may render him the still more important service of awakening his desire for further knowledge. But the true teaching of science consists not merely in imparting the facts of science, but in habituating the pupil to observe for himself, to reason for himself on what he observes, and to check the conclusions at which he arrives by further observation or experiment. * * In the opinion of the most eminent men of science and some most successful teachers, there is no difficulty in introducing science at a very early age. (Page 6.)

We desire to record our opinion that school laboratories should be constructed so as to supply accommodation for practical work in physics as well as in chemistry. It will be seen from the secretary's report that many persons of experience in education have arrived at the conclusion that chemistry is not so well fitted for the practical instruction of young pupils as physics. Without attempting to decide this disputed question, we would express our conviction that neither of these forms of practical work ought to be neglected in school teaching. (Page 5.)

We cannot but regard the almost total exclusion of science from the training of the upper and middle classes as little less than a national misfortune. Our opinion is that scientific instruction ought to commence from the beginning of the school career. (Page 10.)

We recommend (1) that in all public and endowed schools a substantial portion of the time allotted to study should, throughout the school course, be devoted to natural science; and we are of opinion that not less than six hours a week, on the average, should be appropriated for the purpose; (2) that in all general school examinations not less than one-sixth of the marks be allotted to natural science; (3) that in any leaving examination the same proportion should be maintained. (Page 10.)

Secretary Lockyer's report.—This, with its appended papers, gives very copious details of the organization of the schools investigated and the various ways in which they were teaching science at the date of the report, 1872. We quote:

At Rugby, in the middle school, and therefore with younger boys [age 16½], the

teaching of physics has been found to be less satisfactory than in the upper school. The subjects that have been tried are hydrostatics and pneumatics, with the elements of heat; but, although most of the boys have shown considerable interest in the facts and experimental illustrations, the power of grasping the principles and applying their knowledge to easy problems has been acquired comparatively by few. * * * The experience of the masters goes to show that [in the upper school] physics, including heat, magnetism, and electricity, and geometrical optics treated experimentally, can be taught successfully to a larger proportion of boys than chemistry. Indeed, it would seem that a boy requires an almost special turn of mind to grapple successfully with the ideas involved in chemical affinities and reactions. (Page 23.)

Some of the other schools pay special attention to chemistry.

There are many indications that the teaching of even the elementary parts of physics to young boys is best accomplished by associating the teaching with experiments and by allowing the boys to do the latter for themselves as far as possible. (Page 42.)

Experience at University College School shows that "a smaller quantity should be taught, but more perfectly. It should be more general in character, and should take in more of the every-day life of a boy, so as to make him think of science despite himself. * * * Boys should be taught some scientific facts much earlier than they are at present, certainly before thirteen years of age." At present the teacher has to undo the evil effects of past neglect. (Page 57.)

The head master of Winchester suggests that the universities should frame "some definite courses of natural science teaching: (*a*) of a standard fitted for a boy's main study; (*b*) of a popular kind, fitted to be an universal study for all boys, subordinate in position, but sufficient to give some real knowledge." (Page 60.)

Mr. Wilson, of Rugby, writes:

The decided opinion of those who have given most attention to the subject is that experimental physics ought to form the staple of scientific teaching at schools. (Page 107.)

Mr. Orme, of University College School, writes:

In the junior classes the boys have been taught to reason from stated phenomena rather than to be perfectly accurate in their memory of them; in the senior classes they themselves bring about these phenomena in a practical class and describe them fully in the theoretical one. Very special attention has been paid to popular fallacies, incorrect expressions, faulty definitions, and baseless theories. (Page 122.)

Mr. Angell, of the Manchester Grammar School, writes:

Physics and chemistry receive an equal degree of care. Beginners seem to derive most profit from acoustics and the more advanced students from optics and chemistry, electricity and heat occupying an intermediate position. The time occupied in the class is given to oral teaching and experimental demonstration. I find the "Socratic" form of lesson the most efficient. The information required to be taught is either educed or built up by series of logical questions systematically put to the boys, not on what they have acquired verbally from the book or the teachers, but put to them on the apparatus, the experiment, or the phenomena, or problems as they are actually before them. * * * Text books are mainly used for recapitulation and revision [for home work only]. The book work is used as supplementary to the oral lesson; that is, not so much for the purpose of communicating information as for supplying a literary model of connected scientific exposition.

Note books are to be written up at home, not in class, as this diverts the attention. (Page 182.)

At Harrow experimental physics is the only subject which has been taught regularly:

As far as it has been attempted, a lesson in which the boys are made to repeat experiments which they have seen performed by the teacher at a previous lesson, or other simple experiments, is found to be by far the most effective. (Page 185.)

Appended papers.—The secretary has appended to his report a long list of apparatus and experiments in physics, which is not very suggestive and is too long for quotation, and some lectures and papers by prominent English masters, from which the following extracts or suggestions are drawn.

Mr. Wilson, of Rugby, in an address (quoted from the Educational Times, April, 1872), says that the modern pressure on the schools has led to a distracting variety of studies, that "tends to eliminate the close study of details and the *drudgery* that is essential in all good work." The best 20 per cent. of our scholars know more when they leave us, but they have less power of acquiring knowledge than former students. A successive instead of a simultaneous method of instruction—a stratification of studies—will remedy this to a large extent. The earliest of the scientific studies, natural history, "should be so taught as to ascertain, develop, and train any scientific powers the boys may have. * * * It would be pedantic to teach these subjects in strictly scientific order: they must be so taught as to stimulate the thirst for knowledge, to fire the imagination, to open the eyes to the objects and interests of science, and to give a solid body of information which the results of later study may crystallize round." "It may seem to some that the amount of positive knowledge gained is too little; indeed, it is not as much as would be gained by half the time spent in learning somebody's advanced text book. But from the one system the boy emerges hungry for more knowledge, and his own reading will supply his wants; he emerges with a clear understanding how science grows and what it is and has a framework in which he can fit all knowledge he subsequently acquires; while from the other he comes out—perhaps some of my hearers know how he comes out." "Methods of teaching are very important, but the teacher is of far more importance." "I do not see any reason for doubting that these subjects [natural science] are the best for early education, say from the ages of twelve to fourteen. At such an age chemistry or physics cannot be understood except in the rarest cases. I know that Faraday expressed an opposite opinion; but Faraday loved the children and never examined them."

Professor G. C. Foster, F. R. S., professor of physics at University College, London, in an address on the teaching of physics (quoted from the Educational Times, February, 1872), urges that the mental discipline of the study is of more value than the facts stored up in the memory, although of course this discipline comes from reasoning on facts that must be learned. An attempt to state the precise nature and educa-

tional advantages of the mental training derivable from physics is made in the following paragraphs:

A habit of generalizing is acquired, of trying to find the truth underlying or common to several partial, perhaps in appearance contradictory, truths. "A closely allied mental habit is also cultivated, that of distinguishing among the details which a particular phenomenon may present those which are essential to its nature." To give this training physics is the best science, for "in no other department of knowledge do we meet with ascertained laws at once as definite and as various as those of physics."

"The strict, quantitative character of the principal physical laws, moreover, renders the study of physics a very valuable discipline in the strict and careful use of language. * * * Our language must agree accurately not only with our meaning, but with the truth of nature."

Lastly, while other studies may cultivate better the habit of minute and accurate observation, "probably no science affords so good a discipline as physics in the right interpretation of our observations; for in no other science is it possible to draw such definite conclusions or to test them so rigorously by experiment."

To sum up what has been said, "this study tends specially *to develop the power of thinking definitely and correctly*;" and this statement may serve as a guide in the discussion of the method of teaching physics.

The teacher must help the student to learn facts for himself, that he may have living ideas, not a form of words, to think on. The curiosities of science must be omitted. Among these are such facts as can be brought into relation with what is familiarly known only by processes of mathematical reasoning that are beyond the reach of beginners. The value of physical knowledge for the purposes of elementary instruction depends entirely on the completeness with which it can be understood. We should therefore make the smallest possible demands upon the faith of our pupils and shun as much as possible all necessity for using such phrases as "It can be shown," "It may be proved," &c.

The method is advocated of letting the boys perform most of the experiments for themselves. "My experience leads me to think that merely qualitative experiments are of little use in practical instruction. They do not afford sufficient occupation for either hands or head, and are therefore apt to degenerate into play. Simple physical measurements, on the contrary, give plenty to do and yield far more instruction." An illustration is given of forming an image by a lens.

But the most important part of the teaching is the informal lecture by the teacher to point out the full meaning of each experiment and the bearing of the different experiments on each other, as well as to show what the general laws of physical phenomena are and how they can be established. Illustrative experiments will accompany the lecture and serious questions and interruptions will be welcomed as the
[illegible]

best helps to getting the pupils to *think*. Only by experience in teaching can one know the immense difficulty of imparting to others what is perfectly clear to himself.

(1) The first essential of successful teaching is that the teacher have an absolutely clear idea of what is to be taught. (2) We must be on our guard against letting experiments occupy the place of the principles they are employed to establish and letting the mechanical details obscure the perceptions of the experiments. Here the elementary text books are often at fault. (3) "The use of technical terms cannot be avoided, but we must remember that the use of the study of physics is not to explain such terms, but the use of the terms is to facilitate the study." Therefore explain new ideas in common language, even at the risk of considerable circumlocution. First demonstrate the existence of the property in question and then give a name to it.

Rev. W. Tuckwell, head master of Taunton College School, in a paper on the method of teaching physical science in schools, read before the British Association at Exeter in 1869, says: "The time to be given to science should not be less than three hours per week." Two years may be spent on mechanics, the first year's teaching being oral, with easy problems and abundant experiment, and careful writing out of notes and making drawings; in the second year use a good text book. Then two years are to be given to inorganic chemistry and one to botany. The boys are now sixteen or seventeen years old; if any remain longer they may study physiology. He adds:

My experience has shown forcibly the unexpected value of general culture in teaching special subjects. The man who knows science admirably, but knows nothing else, prepares boys well for an examination; but his teaching does not stick. The man of wide culture and refinement brings fewer pupils up to a given mark within a given time, but what he has taught remains with them; they never forget or fall back.

Extracts from the evidence.—T. H. Huxley, F. R. S., professor at the Normal School of Science and examiner for the Science and Art Department in physiology and general biology, examined:

Questions 318–321. I have no doubt whatever that a certain amount of scientific teaching of a very valuable kind might be given to children of the ages now specified [about eleven years]. I think that the nature of your scientific teaching must be very carefully determined, but I think that a great deal of what may be fairly called elementary science, with respect to the ordinary phenomena of nature, is information which might be made very complete in its way, although of course it would be very elementary; indeed, I am quite sure, from my own knowledge of children, that that may be given to children under twelve years of age with extreme benefit, e. g., elementary physical geography. The elementary physics, I imagine, may be taught with perfect ease. The great blunder that our people make, I think, is attempting to teach from books; our schoolmasters have largely been taught from books and nothing but books, and so make nothing of scientific teaching. If you are setting to work to teach a child science, you must teach it through its eyes and its hands and its senses.

Q. 355, 356. I should like to restrict the teaching of elementary science to mathematics, physical geography, elementary physics, and chemistry, and to botany and human physiology in elementary day schools. * * * Without a knowledge of elementary

physics and chemistry all further progress in science comes to an end. It is all loose and vague.

R. B. Clifton, F. R. S., professor of experimental philosophy at the University of Oxford, examined:

Q. 3094–3097. (In answer to Professor Huxley.) I see no harm in doing that [giving children of, say, twelve years and upwards an account of the ordinary operations of nature], but it requires to be done with very great care and it requires an extremely skilled person to do it. The children must be made thoroughly to understand that the explanations are incomplete, and every effort must be made to prevent their becoming satisfied with such explanations. * * * I think the way the teaching has been given is calculated to do considerable harm, judging by the results. Information may be given as to the main facts of science, but the extreme difficulty of giving incomplete explanations to a child without injurious effects would lead me to prefer that systematic instruction of that kind should be postponed until some proper foundation has been laid. If the student has been taught nothing but what he could comprehend, I should think he would be the better for such instruction. But from experience I should prefer that a student should come to me with no knowledge of physics at all, unless he has learned thoroughly what he professes to know. It is frequently the case that boys, and men also who have come to me, talk glibly about the laws of attraction of electrified bodies, and magnetic bodies, and so on, but have not the remotest notion of what is meant by the composition of forces. The phenomena about which they have learned do not appear to have a different effect upon their minds from that which would be produced by a conjuring trick.

N. S. Maskelyne, F. R. S., professor of mineralogy in the University of Oxford, examined:

Q. 4119, 4120. The classificatory sciences—mineralogy, botany, and zoölogy—are not well adapted for the schools. You can make of them the most valuable means of education for the faculties of observation while those faculties are keenest and are growing in early life, and later on you may give them a high place in your educational system by implanting them on a scholastic, scientific training; but if, in the interim, you introduce them as educational subjects you do so, or you must be supposed to do so, to the exclusion of something else, and I think it would be a pity to exclude anything which was involved in the exact philosophical treatment of the grammar of a subject like chemistry or physiology or physics for the sake of substituting a merely classificatory science in its place.

G. D. Liveing, professor of chemistry in the University of Cambridge, examined:

Q. 4616, 4631. I should hardly think it possible to introduce into the elementary schools any teaching of science except the classificatory sciences, botany and zoölogy. Of physical geography but little, since this involves a more complicated knowledge of the laws of nature of rather a varied character. The laws of heat and pneumatics, and so on, must be learned before much physical geography can be learned. The time devoted to science instruction in the middle class schools has been inadequate, so far as I have seen. They underrate the time in which new ideas can be grasped and the time required really to turn them over before a fair knowledge can be acquired.

G. C. Foster, F. R. S., professor of physics in the University College, London, and examiner for the Science and Art Department, examined:

Q. 7815, 7819. I make it a condition that students wishing to enter the laboratory shall have attended one of my courses of lectures or have obtained equivalent instruction elsewhere. Q. 7817. Do you not think that it would be very practicable to introduce elementary physics into schools? I think with great advantage and very easily. I do not see any difficulty at all in teaching school boys by lectures;

but to organize practical instruction, in which they should actually make experiments themselves, which I think is by far the preferable method, is no doubt difficult; but I should think that arrangements might be made.

W. B. Carpenter, M. D., F. R. S., registrar of the University of London, examined:

Q. 7866. We find practically that, in natural philosophy especially, at the matriculation examination, the preparation is extremely bad, that the style of answering generally is very imperfect, and very great ignorance is shown of the subjects—an ignorance arising from the want of the power of applying their minds to them. The candidates who have a certain amount of knowledge of science are not able to reason upon their knowledge and to answer questions that go a little out of the ordinary routine of the books in which they prepare. That strikes me very forcibly as the result of preparing merely from text books, without any kind of objective instruction, without being led to know what those principles and formulæ really mean in relation to the actual phenomena of science.

Right Rev. James Fraser, Lord Bishop of Manchester, examined:

Q. 8287 et seq. The witness had been for some time an inspector of schools, and as an assistant commissioner had spent five months in the United States and Canada, about 1870, collecting information about educational matters. He finds that far too many studies have been introduced into the American schools, and that the introduction of the scientific studies worked mischievously; "a sufficiently exact knowledge is not retained; the forces of the mind get dissipated, and the pupil has not learned how to acquire exact knowledge afterwards in any subject; in fact, the system produces a disinclination to take up any subject with a view of accurate knowledge." The primary instruction is good; in the secondary stages the American system breaks down. The preëminent merit of the schools is their graded system.

IV. ACTION OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

This body has appointed various committees from time to time to consider the broad subject of scientific instruction. In 1867 a report on the general subject was presented (pages xxxix–liv). The points touched on are (1) the demand; (2) the recognition of science in a general way; (3) the reasons for introducing it into schools; (4) the difficulties; (5) subjects; (6) methods; (7) suggestions. Under (5) the report says:

There is an important distinction between scientific *information* and scientific *training*; in other words, between general literary acquaintance with scientific facts and the knowledge of methods that may be gained by studying the facts at first hand under the guidance of a competent teacher.

The subjects recommended for the first are, in brief, physical geography and natural history; for the second, experimental physics, elementary chemistry, and botany.

The study of experimental physics involves the observation and colligation of facts and the discovery and application of principles. It is both inductive and deductive. It exercises the attention and the memory, but makes both of them subservient to an intellectual discipline higher than either. * * * We do not entertain a doubt that the competent teacher who loves his subject and can sympathize with his pupils will find in experimental physics a store of knowledge of the most fascinating kind, and an instrument of mental training of exceeding power.

Under (6) it is urged that some study of science should be compulsory; this may be supplemented by voluntary work. (7) At least three hours a week should be devoted to scientific instruction. In the appendix reference is made to the "valuable and suggestive official programs" of the French minister. Extracts from these have already been given.

In 1874 a report was published on the teaching of physics in schools by a new committee, consisting of Professors H. J. S. Smith, Clifford, Adams, Stewart, Clifton, Barrett, Everett, and Foster and Messrs. Fitch, Griffith, Watts, Wilson, and Lockyer. The committee "have assumed as a point not requiring further discussion that the object to be attained by introducing the teaching of physics into general school work is the mental training and discipline which the pupils acquire through studying the methods whereby the conclusions of physical science have been established. * * * They therefore think it of the utmost importance that the first teaching of all branches of physics should be, as far as possible, of an experimental kind. Whenever circumstances admit of it the experiments should be made by the pupils themselves," and though not necessarily every experiment, certainly some of them. It is hardly possible to do without text books, but they must be subordinate to the experimental demonstrations and used for review, not for the advance lesson. The committee say:

Considering that all explanation of physical phenomena consists in the reference of them to mechanical causes, * * * the committee are of opinion that it is desirable that the school teaching of physics should begin with a course of elementary mechanics, including hydrostatics and pneumatics, treated from a purely experimental point of view.

Arithmetic and the first book of Euclid will be enough of mathematics for beginners. The order of the other branches of physics is not essential. It is suggested that heat come next, then geometrical optics, and afterwards electricity and magnetism.

No very beneficial results can be looked for from the general introduction of physics into school teaching unless those who undertake to teach it have themselves made it the subject of serious and continued study and have also given special attention to the best methods of imparting instruction in it. (Pages 71–73.)

More recent committees, e. g., in 1882 and 1884, have been occupied in urging the introduction of rudimentary science into the elementary schools, and watching the workings of the education code, with especial regard to its influence on scientific training. (Compare what has been said under "The education code," pages 83–86.)

V. MISCELLANEOUS ESSAYS AND ADDRESSES.

Essays on science teaching in the Journal of Education. — The reports of the agitation in England for reform in scientific education are by no means confined to blue books, as every one knows; some of the most valuable papers for the present purpose are in other books or are to be found in the files of the educational journals.

In the Journal of Education (London) there has been during the last two years a series of articles on science teaching, by a number of masters, of unusually high practical value. Unfortunately, a complete file of the Journal could not be obtained in time to examine it, so some valuable papers are doubtless omitted in these abstracts.

Mr. Worthington, of Clifton College, says that at Clifton in the "modern side" [non-classical] physics is begun at fifteen to sixteen years, with three and then four hours a week, of which two are devoted to lectures and two to laboratory work. In the laboratory one master can attend to 30 boys, working in pairs. When the laboratory work was substituted for lectures the boys acquired an excellent foundation, but no superstructure; they could not deduce principles for themselves; by the lectures alone they acquired principles and ability to solve problems. The true function of lectures is, therefore, to teach the pupil to deduce principles from his own experimental data; the two modes of instruction must run hand in hand. The ability, or rather the desire, to induce seems not to be common and is not much affected by laboratory work.

It must be admitted that the powers of independent observation remain for the mass of boys but feebly developed, and the improvement of the judgment and growth of the inductive powers seem very slight, probably not much greater than what is secured by other studies, while the tendency to appeal to dogmatic authority as final is hardly checked. But the study has, even on the mass of boys, an unexpected influence, as much moral as intellectual, which is shown in an increased and increasing respect for precision of statement and for that form of veracity which consists in the acknowledgment of difficulties. It produces a real effect to find that nature cannot be imposed upon. (October, 1882.)

Dr. Wormell considers schools of somewhat lower grade than the great public schools. The boys whose training he considers will leave at fifteen or sixteen, most of them intending to follow some commercial pursuit. The specialty of these schools is science, though they are not advanced or special enough to be trade or technical schools. "The teaching of science should be by lesson, not by lecture. Three things are to be secured, and it is only by oral question and answer in rapid succession that it can be shown when the desired results are attained. The pupil has to learn to see what he ought to see, to describe what he sees, and, finally, to reason on the connection of what he has seen and described." The pupil must experiment for himself, using apparatus of his own making when possible, and at first only repeating what he has seen done. In the lesson it should be said of each experiment whether the student is to repeat it at home or in the laboratory (with supervision), or leave it entirely to the teacher.

In the school whose course is thus described the younger boys have two lessons per week of three-quarters of an hour each, followed by a

half hour in laboratory. In the upper classes there are six lessons a week, each followed by two hours of laboratory work; that is, eighteen hours per week out of thirty are given to science. "As a rule it is found that the most useful laboratory work is quantitative rather than qualitative. Most of it should consist of making measurements under given circumstances and tabulating or plotting out the results." (January, 1883.)

Mr. E. W. Claypole urges, after an experience of twenty-five years in teaching the sciences, that laboratory work in *both* chemistry and physics is of the first importance, and should not be voluntary, to be taken in play hours; if necessary, give up the book lessons in its favor. (February and July, 1883.)

Mr. R. E. Steele writes:

The chemical laboratory should not be entered till after many months of class work, seeing experiments, and so training the powers of observation. A mistake is often made by giving only the interesting part and omitting dry calculations, so when a higher course is taken the students have too much drudgery, and lose their interest, never regaining it. In physics I consider a boy may begin with practical work, on the one condition that it be entirely quantitative, at the same time that he begins lectures; but it is not a necessary part of the work. With regard to the order of the studies, geography should be taught by a science master, especially physical geography; then physiography, then heat, which is a part of great educational value. Biology and geology are of doubtful value. Botany I have had no experience with. It would be very desirable to have an annual conference of science masters to stereotype somewhat our methods of teaching, and so attain the (in this respect) fortunate positions of teachers of classics and mathematics who no longer have to make experiments. (April, 1883.)

Professor Minchin, in an address before the Education Society on the teaching of mathematical physics, published in the Journal of Education (October and November, 1883), though not belonging to the series from which quotation has already been made, makes one or two points pertinent to the present matter. He declares that the English text books are (with few exceptions) marked by obscurity.

I am not alone in saying that if on any given scientific subject I knew of two works covering the same ground, the one by an English, the other by a French writer, I should unhesitatingly prefer the French work, because I should feel certain of meeting in it with a clear, simple, and logical exposition of the subject. The student has a right not only to the truth, but to be forewarned of errors and difficulties.

I believe in no method of teaching, whether oral or in books, which is not Socratic in its idea. In oral teaching you can question, you can draw out and deal with individual characteristics and difficulties, and, placing yourself exactly in the position of a student, make use of his own admissions for the purpose of refuting his own objections, and this is by far the most efficacious method of teaching. All this cannot be done in a book, but a great deal of the same kind can be done.

Perry's Practical Mechanics is praised warmly. (An important principle of the book is that all experimenting must be quantitative.)

Mr. Joseph Payne, the first professor of the science and art of education in the College of Preceptors, London, has written vigorously on the subject, being in sympathy with the views already quoted from so many

writers. In his lecture on "The true foundation of science teaching" (collected "Lectures, &c.," pp. 187–205), he says:

> The conclusions, then, at which we arrive are: (1) That the true foundation of physical science lies in the knowledge of physical facts gained at first hand by observation and experiment, to be made by the learner himself; (2) that all knowledge not thus gained is, pro tanto, unorganizable, and not suited to his actual condition; and (3) that his facts become organized into science by the operation of his own mind upon them. * * * The teacher is a superintendent or director of the learner's process, pointing out the problem to be solved, concentrating the learner's attention upon it, varying the points of view, suggesting experiments, inquiring what they result in; converting even errors and mistakes into means of increased power; bringing back the old to interpret the new, the known to interpret the unknown; requiring an exact record of results arrived at — in short, exercising all the powers of the learner's mind upon the matter in hand, in order to make him an accurate observer and experimenter and to train him in the method of investigation.

This true method he thinks is utterly ignored by the Science and Art Department, for their examinations do not necessitate anything more scientific than the cramming of text books.

In his appreciative preface and supplement to Miss Youmans's Essay on the Culture of the Observing Powers of Children, Professor Payne remarks that—

> Valuable as the study of botany is as a means of cultivating the observing powers, * * * it leaves altogether uncultivated the instinct of experiment. A child may become a proficient in descriptive botany and remain ignorant of the action and reaction of forces and of the relation between cause and effect. (Page 218.)

So he advises taking up afterward the study of mechanics; as a model lesson half a dozen pages are devoted to examining the action of a pile driver, using question and answer and bringing out the meaning of the terms density, porosity, friction, gravitation, velocity, cause, and effect. We can readily believe the disclaimer, in another connection (page 188), "though not qualified by scientific knowledge to speak of science," when we learn from the model lesson that "in the leaden weight the matter is twice as dense as in the wooden one" (page 221), and that "a moving force is called momentum. What is it made up of? Answer. Motion and weight."!

But to resume the *method:* the second lesson should be a review, and any devices the children have thought of may be examined, with new experiments; in the third lesson remove the machine, examine to see what *ideas* have been retained, and then show a drawing.

In an essay on "The curriculum of modern education," an amended curriculum is proposed (page 282), including, for children from about

8 to 10 years of age, lessons on objects;

10–12, botany, general facts and phenomena of elementary physics;

12–14, physics as a training subject, 5 hours out of 40 a week;

14–16, chemistry or human physiology, 10 hours out of 40 a week.

Two remarks may be quoted: "It appears then that scientifically constructed treatises which begin at the beginning—a beginning which is really the end of the investigator's labors—are unsuited to the wants

of a child." (Page 228.) "And Professor De Morgan says: 'Nothing flies so quickly as half-digested knowledge, and when this is gone there remains but a slender portion of useful power.'" (Page 253.)

Readers who are interested in Professor Payne's views will find them further developed in his article, "Science," in Kiddle and Schem's Cyclopædia of Education.

Mr. James Ward, president of the Education Society, in his address of October, 1883 (Journal of Education, London, November, 1883), presents another phase of the teacher's work. He says:

The difference between certainty and probability or conjecture, between truth and opinion, is one which the educator should not fail to make felt. It is not, of course, desirable that subjects which are still mainly in the hypothetical stage should be taught in schools and to beginners. But what is merely probable or supposable, or matter of opinion, so far exceeds in quantity what is certain, that we cannot go far in any direction without coming upon it. * * * To keep the scholar in an atmosphere of real or apparent certainty, when in after life three-fourths of his intellectual occupation will be to deal with uncertainties, is as foolish as it would be to keep him out of the water till he has learned to swim. * * *

To know that you don't know is also knowledge, and perhaps there is no knowledge a man can possess that will do more to save him from error than this clear perception of his ignorance of the line at which certainty ceases and doubt begins. * * * But over and above logical training, a profound love of truth must be quickened and kept vigorous in the student's mind. This is the crown and glory of an intellectual education, and to produce it is the sublimest office the teacher has to discharge. And here his example will be more effective than his precepts. There is nothing harder than to be at once enthusiastic and exact, free alike from the frigid uniformity of a calculating machine and the indiscriminating fervor of a partisan; but between these lies safety.

Rev. J. M. Wilson, M. A., F. G. S., F. R. A. S., "On teaching natural science in schools." No name occurs more frequently in the reports of the agitation of our subject than Mr. Wilson's. A senior wrangler at Cambridge, he was for many years an assistant master at Rugby and is now head master of Clifton College; his name has already occurred in these extracts, for as a prophet he has honor even in his own country. This essay is found in Essays on a Liberal Education:

A good style perhaps may be got by reading and writing. Thinking is learned by thinking. And therefore that method of giving scientific instruction is best which most stimulates *thought*; and those subjects which afford the best illustrations of the best method ought to be selected for instruction in schools. (Page 267.)

Now there are two different methods of teaching science: one, the method of investigation; the other, the method of authority. The first starts with the concrete and works up to the abstract; starts with facts and ends with laws. The second starts with what we call the principles of the science; announces laws and includes the facts under them. * * * The latter is the easier and is seen in most text books; the former is by far better. * * * In the first place, then, *knowledge must precede science*, for science is nothing else but systematized experience and knowledge. In its extreme applications this principle is obvious enough: A certain broad array of facts must preëxist before scientific methods can be applied. * * * Secondly, the knowledge must be homogeneous with preëxisting knowledge. * * * Hence, the master's business is to take up the knowledge that already exists; to systematize and arrange it; to connect scraps of knowledge that seemed isolated. * * * Rapidly knowl-

edge crystallizes round a solid nucleus; anything the master gives that is suited to the existing knowledge is absorbed and assimilated into the growing mass; and if he is unwise and impatient enough (as I have been scores of times) to say something which is to him perhaps a truth most vivid and suggestive, but for which his boys are unripe, he will see them, if they are really well trained, reject it as the cock despised the diamond among the barley (and the cock was quite right), or, still worse, less wise than the cock, swallow it whole as a dead and choking formula.

On these grounds, then, in addition to other obvious ones, botany and experimental physics claim to be standard subjects for the scientific teaching at schools. In both there preëxists some solid and familiar knowledge; both can be so taught as to make the learner advance from the known to the unknown, from his observations and experiments to his generalizations and laws, and ascend by continuous steps from induction to induction, and never once feel that he is carried away by a stream of words and is reasoning about words rather than things.

Geology and physiology are for this training inferior, and chemistry, on all grounds, must follow physics.

Unless this method of investigation is followed, the teaching of science may degenerate with an amazing rapidity into cramming. To be crammed is to have words and formulæ given before the ideas and laws are realized. Geology and chemistry are frightfully crammable, but botany and experimental physics are by no means so easy to cram. (Page 270.)

Some pages are devoted to illustrating the method in botany.

The next training subject is unquestionably experimental physics. This term is used, commonly, to denote the sciences which can be studied experimentally, without an extensive knowledge of mathematics, and excludes chemistry. Mechanics and mechanism, heat and light, electricity and magnetism, hydrostatics, hydrodynamics, pneumatics, and acoustics are the principal branches of the subject. In selecting from them the subjects most fit for use at schools and in choosing the order in which they should be taught, we must be guided by the principles already enunciated. We must proceed from the concrete to the abstract, from the familiar to the strange, from the science of masses to the science of molecules; hence mechanics and mechanism must come first. In a year most boys are able to learn the great principles of statics and dynamics and the elements of mechanism, such as the ordinary methods of converting one kind of motion into another. They become tolerably familiar with the ideas of motion and space and time and form in their exact numerical relations. Ignorance of arithmetic and the want of ideas in practical geometry are the main hinderances in their way; but even they are improved by the many illustrations of arithmetic and geometry that are afforded by mechanics and by the growth of exactness in all ideas of quantity and form as expressed by numbers. In mechanics also the notion of force is constantly present in its commonest and simplest forms; and in this respect also this branch of science serves as the best introduction to the later branches.

Hydrostatics and pneumatics, I do not doubt, are the best subjects to take next. The range of these subjects that could be taught at school is not great. * * * Hydrodynamics, acoustics, and geometrical optics * * * should be reserved for university teaching.

The next year's course should be heat and the elements of electricity. By the time boys have reached this stage they are far more able to acquire new subjects than in the previous stages, and are fit to enter on those branches of physics if they have studied the earlier subjects intelligently. And of all subjects of experimental investigation heat seems to me the best for work at schools. The phenomena of heat are so universal and familiar; it has so central a position among the physical sciences; its experimental methods are so perfect; it affords such a variety of illustrations of logical processes, that it seems unrivalled as a subject for training in science. And,

allowing for seventy lectures in the year, it is clear that this year's course will allow of some time being given to electricity. * * *

The methods of teaching physics will be different in different hands; they will vary with the knowledge, the enthusiasm, the good sense, the good temper, the practical skill, and the object of the teacher. If the thing to be aimed at is to make them pass a good examination as soon as the subject is read, the best means will be to put a text book into the hands of every one, and require certain parts of it to be learned, and to illustrate them in an experimental lecture with explanations. The lecture may be made very clear and good; and this will be an attractive and not difficult method of teaching, and will meet most of the requirements. It fails, however, in one. The boy is helped over all the difficulties; he is never brought face to face with nature and her problems; what cost the world centuries of thought is told him in a minute; his attention, clearness of understanding, and memory are all exercised; but the one power which the study of physical science ought preëminently to exercise, and almost to create, the power of bringing the mind into contact with facts, of seizing their relations, of eliminating the irrelevant by experiment and comparison, of groping after ideas and testing them by their adequacy, in a word, of exercising all the active faculties which are required for an investigation in any matter—these may lie dormant in the class while the most learned lecturer experiments with facility and explains with clearness.

Theory and experience alike convince me that the master who is teaching a class quite unfamiliar with scientific method ought to make his class teach themselves, by thinking out the subject of the lecture with them, taking up their suggestions and illustrations, criticising them, hunting them down, and proving a suggestion barren or an illustration inapt, starting them on a fresh scent when they are at fault, reminding them of some familiar fact they had overlooked, and so eliciting out of the chaos of vague notions that are afloat on the matter in hand, be it the laws of motion, the evaporation of water, or the origin of the drift, something of order and concatenation and interest, before the key to the mystery is given, even if after all it has been given. Training to think—not to be a mechanic or surveyor—must be first and foremost his object. * * * For all classes except those which are beginning, the union of the two methods is best.

The work out of school for a natural science lecture consists chiefly at first in writing notes on the previous lecture. When the lecture has been discursive and the method hard to follow, some help may be given by a recapitulation; but in general it may be left to the boys. It is an admirable exercise in composition. To reduce to order the preliminary facts, to bring out the unity in them, to illustrate, to describe, to argue, and that about things in which they are interested and for which they feel themselves a match, are the very best exercises that can be put before boys. They begin with a helplessness and inanity almost incredible, improve constantly, and end generally by writing these notes very well. And in the higher classes the working of examples and problems may well be thrown in part on the out-of-school hours.

THE UNITED STATES.

The *American Association for the Advancement of Science* has appointed for a number of years a committee on science teaching in the public schools. At the Boston meeting in 1880 a vigorous report was made on "certain radical deficiencies in current science teaching" (Proceedings, 1880, pp. 55–63; also reprinted in the Popular Science Monthly, XXIII, 207), signed by E. L. Youmans, A. R. Grote, J. W. Powell, N. S. Shaler, and J. S. Newberry. A few extracts are pertinent here:

Scientific inquiry at length grew into a method of forming judgments which was characterized by the most vigilant and disciplined precautions against error. * * *

The scientific method is simply a systematic exercise in truth seeking and is the only mode of using the human mind when it is desired to attain the most accurate and perfect form of knowledge. Our public schools, unhappily, make but little use of this method in the work of mental cultivation. They have grown up in conformity with the ideal that a school is a place where knowledge is got from books by the help of teachers. As a consequence the science teaching in the public schools is generally carried on by *instruction*. The pupil is filled up with information in regard to science; he learns it much as he learns geography and history.

As thus treated the sciences have but little value in education. They fall below other studies as a means of mental cultivation. * * * They are not employed to train the faculties in the various ways to which they are severally adapted. They are not made the means of cultivating the observing powers, stimulating inquiry, exercising the judgment in weighing evidence, nor of forming original and independent habits of thought. The pupil does not know the subjects he professes to study by actual acquaintance with the facts, and he therefore becomes a mere passive accumulator of secondhand statements. * * * This mode of teaching has been denounced by all eminent scientific men as a "deception," a "fraud," an "outrage upon the minds of the young," and "an imposture in education." * * *

The method of object lessons in primary schools has not yielded what was expected of it, and is in no true sense a first step in science. Nothing is gained educationally by barely having an object in hand when it is talked about. Myriads of objects are present to the senses of people, but no insight follows. The observing faculties must be tasked if they are to be trained. The pupil is not to have the properties of objects pointed out, but he is to find them out. The scientific aim is to replace vague, confused impressions by clear and accurate ideas.

Instruction in elementary science in schools of a somewhat higher grade is carried on by what is known as oral teaching—

which is everywhere growing in favor and is, we are told, a successful revolt against book studies. * * * This looks fair, but it is delusive. The method does not remove the book that the pupil may come at the phenomena, but it removes the book that the teacher may take its place. * * * So far as real science is concerned it is doubtful if this method is not worse than the one it replaces. * * * There is only the substitution of a superficial class activity for the more deliberate work of the individual pupil. More mental effort is required on his part to get a lesson from a book than to listen to a lesson given by the teacher. The teacher is to do everything, and stands in the place not only of the book but of the pupil also. Is not this a step backward in education? * * * Oral teaching implies a fertility, a versatility, and a proficiency in scientific knowledge on the part of teachers which that class of persons does not possess. * * * Where it is all talk and no work, and text books are filtered through the very imperfect medium of the ordinary teacher's mind, and the pupil has nothing to do but to be instructed, every sound principle of education is outraged and science is only made ridiculous.

This failure is largely due to the supposed necessities of a graded system, in which the individual is subordinated to the system. "The value of educational systems consists simply in what they do to incite the pupil to help himself. Mechanical school work can give instruction, but it cannot develop faculty, because this depends upon self exertion. Science, if rightly pursued, is the most valuable school of self instruction. * * * The bad system is continued chiefly from the lack of knowledge as to the possibilities of a better. But the better method of teaching science has proved entirely practicable;" and the appoint-

ment is urged of a committee to gather from the experiences of teachers practical plans of improvement in science teaching.

The University of the State of New York.—This body is the only example in this country of an examining board similar to several in England. "The incorporated academies and the academical departments of union schools in the State are by law placed under the visitation of the regents of the university. The benefactions which the State annually bestows on these institutions are distributed by this board." "The income of the literature fund, amounting to $40,000, is required to be apportioned annually among the academies [including academical departments of union schools] on the basis of the attendance of scholars pursuing academical studies." In 1866 a system of written examinations was established to determine what students should be counted among the academical scholars; in 1878 advanced examinations were established, and later the distribution of part of the fund was made by the legislature to depend on the number of students passing them. For each pupil obtaining the regents' academic diploma $10 is paid to the academy that trained him and $15 for each one who takes the regents' college entrance diploma; the former may be obtained at the end of a three-year course; the latter requires four years and admits to most of the colleges of the State. A regents' certificate in certain subjects is also required before one can begin the study of law.

As the examinations are written, no influence, except possibly a repressive one, has been exerted in favor of scientific studies earlier than the academic course. In this, physics appears only as one study in a group of nine, mostly sciences, of which four must be taken to obtain the academic diploma. The schedules given as suggestions for arrangement of courses place physics in the third year; in these and in the detailed syllabus, it is assumed that two-thirds of a year will be given to the subject, but the number of hours per week is not stated. For the college entrance diploma no science of any kind is required. (Official syllabus, December, 1882, and examination papers, February, 1884.)

Other organizations.—There are various organizations of more or less permanent character to which we may look hopefully in the future for action on the subject of a requirement of physics for admission to college, such as the association of New England colleges, of Ohio colleges, the institutions endowed with the land grant of 1862, the National Educational Association (which has a committee considering this subject), &c.; but at present no information from them is available.

List of colleges requiring physics for admission.—The facts already quoted show that in France and Germany some study of physics is obligatory in the secondary schools, and so practically the subject is "required" before the student can begin his higher course leading to any degree. In this country the list of colleges having this requirement is not long, but is constantly lengthening.

The following institutions either have made the requirement or have

announced that it will be made in a year or two (some of these data are drawn from Moseley's College Students' Manual):

I. *On a classical course:* Harvard College: Rolfe and Gillet's Natural Philosophy for High Schools (without the appendix) or Avery; also, two out of four groups of electives; of these Group IV includes Stewart's Lessons and either chemistry or botany.

Boston University: Stewart's Primer.

Syracuse University: Steele's, or an equivalent.

Lehigh University: Stewart's, Avery's, or Gage's.

Ohio Wesleyan University.

Adelbert College of Western Reserve University: elementary.

Denison University: Avery.

Northwestern University.

University of Denver.

University of Minnesota: recommended, not required.

II. *On a non-classical course;* Massachusetts Institute of Technology: Stewart's Primer advised.

Syracuse University: Steele's, or an equivalent.

Lehigh University: Stewart's, Avery's, or Gage's.

Ohio Wesleyan University.

University of Cincinnati: chemistry and physics, six hours per week through one year.

Denison University: Avery's.

Illinois Industrial University.

Northwestern University.

University of Michigan: one full year, Gage's or Avery's.

University of Wisconsin.

University of Minnesota: Peck's, Avery's, or Norton's.

Cornell College, Iowa: elements.

University of Colorado: elements.

University of Denver.

University of California: two electives required out of seven; one of these is physics, Avery's or Peck's Ganot's advised.

City schools.—In the Boston public schools the course of study provides for instruction in scientific subjects from the beginning. The primary course covers three years, the average age of the pupils being a little under seven years; that in the grammar schools, six years, the average age being a little over eleven years. (Report, 1884, pp. 63, 67.)

During the primary years and the earlier years of the grammar school the program requires about two and a half hours a week to be spent in oral instruction. A few of the topics suggested are recitations of poetry, talks on mythology, fables, anecdotes, &c.; plants, animals, simple measurement of length and weight, and the common phenomena of nature. In the suggestions of the supervisors (1878) we read:

Little and often is the secret of success in primary schools, and a few minutes of each session rightly employed in oral instruction will give large results. * * * The

true teacher will begin with the child where he begins, remembering always that while he will be constantly gaining useful information his mental development is the more important result. He should therefore be told nothing which he can find out readily for himself through the exercise of his perceptive faculties in examining objects, natural and artificial. At the proper time he will by comparison form judgments and find ways to express them. * * * Children should be able to tell in simple, easy sentences *what* they know of any object studied, and *how* they learned it.

This is the scheme on paper, but a recent letter from a principal says:

In practice less time is given, and the work becomes rather a language lesson. The craze for oral instruction which struck Boston eight or ten years ago did, in my opinion, a good deal of harm. It is the intention that the science teaching shall be conducted on a purely inductive plan. The difficulties in carrying this plan out are mainly as follows: (1) In controlling the tongues of the teachers and in finding teachers who can handle the method skilfully. (2) The great multiplication of requirements in the lower grade of schools and the fact that no examinations are required in the sciences tend to induce teachers to slight this work (unless in rare cases the teacher has a special fondness for it) and give the time to other work.

Much the same confession is made by the superintendent:

Again, there are many classes—too many—in which next to nothing is done under the heads of observation lessons and elementary science. Of course, there is a way of spending the time devoted to observation lessons which is worse than useless, and that is by giving the lessons in such fashion that the pupils do no observing whatever. The teacher merely tells the pupils this or that about an object and expects them to remember the statements. The object itself might as well be absent for any useful part it plays in the teaching. Rather than have such misnamed observation lessons given I should much prefer the entire omission of them.

Some teachers feel pressed by the necessities for promotion of their pupils, and make sure of "the main things" first, before the "side matters."

These teachers do not, or will not, see that the observation lessons, properly treated, are of very great and direct assistance in speaking, in writing, and in reading; and that, therefore, instead of being an added burden, they are a help to the other kinds of work. (Report, 1884, pp. 27, 28.)

In the fifth and sixth years of the grammar schools physics appears as an independent study, occupying two and a half hours in the two years. The ground covered is "the outlines of physics, taught as far as practicable by the experimental method." In each of the 50 schools of this grade sets of apparatus are provided costing $150 to $200, but no laboratory work of any consequence appears to be contemplated.

In the English high school physics and chemistry are taken up in the third year, along with solid geometry; three hours per week (out of eighteen) are given to each subject. As an elective, experimental physics may be taken in the second year for three hours after November 1 in place of zoölogy, and in the fourth year three hours each are given to two of the following: physics, chemistry, astronomy. In fitting up the new building great attention has been paid to the lecture rooms and laboratories for these subjects. The laboratory method in physics is an

essential part of the teaching and has been wrought out with unusual care.

In the New York City schools elementary science finds a place in the course in oral lessons. These are rudimentary, of course, but most pupils would otherwise get no school knowledge of the sciences. Eighty minutes a week are allotted to this work, part of the time being taken up by slate compositions on the subjects taught. (Report, 1880, p. 43.)

In the Albany (N. Y.) high school the time given to physics has been too short and the results quite unsatisfactory; so the superintendent urges giving "a whole year to this study, with opportunity for daily experiments. *Every* exercise in natural philosophy should begin with demonstration by actual experiment, the class participating as far as practicable." To gain the needed time, drop zoölogy or geology. (Report, 1882, p. 76.)

In the Washington (D. C.) schools considerable attention is paid to objective or experimental teaching of most of the elementary sciences, and laboratories have been fitted up in the high school. (Report of the Commissioner of Education, 1882–'83, p. lxxxvi.)

In the Indianapolis (Ind.) high school the experimental method of teaching chemistry and physics has been introduced and meets with approval from both teacher and pupil. The classes (sections?) are not expected to number more than fifteen. Two years' work in science is required of all pupils. (Report, 1883, p. 46.)

In the Cincinnati (Ohio) public schools object lessons are given during the first five years. In the intermediate (grammar) schools, in the sixth year (average age twelve years), physics is begun and continued through the seventh and eighth years (ages 12.9 and 13.4 years). The order of topics is as follows: In the sixth year, attraction, heat, light; the next year, composition of matter, magnetic and electrical attraction, motion, sound, mechanical powers, properties of matter; in the last year, complete the subject and review it. Hotze's First Lessons in Physics is used for teachers only. "The lessons are to be given in the simplest form possible; and, as far as practicable, by the *object method*. Only the most general and obvious features must be presented. Definitions of terms used must not be memorized by the pupils nor recorded in blank books. The experiments and their results may be recorded. Examinations are only oral." (Report, p. 264). Complaint is made that the teachers have not the necessary apparatus; $300 would, in the superintendent's opinion, be sufficient for the next year [for the four intermediate schools and thirteen intermediate departments in district schools] (p. 71).

In the high school course physics is taught from a syllabus four hours a week during the third year (age 16.5 years) to all except to classical students; these have one hour a week for a half year. All students take chemistry four hours for at least half of the last year (pp. 359, 360). In one of the high schools, however, physics comes a half year later,

and Norton's Elements of Natural Philosophy is used as a text book. (Report, 1882.)

In the St. Louis (Mo.) public schools we find one of the most carefully wrought-out schemes for scientific studies that have ever been planned. It is the result of many years' planning by the former superintendent, Dr. W. T. Harris, and has been in successful operation since 1871. Superintendent Philbrick, of Boston, reprints it in full in his report for 1877. The course is spiral, covering substantially the same ground three times in the eight years' course in the district schools, but broadening and deepening the child's knowledge at each cycle; the first and second cycles occupy each three years, and the last one the remaining two years of the course. It may be convenient to bear in mind that children are admitted to the schools at six years of age; the average age on entering the high school is fourteen years and five months, and the average age of leaving school is thirteen and six-tenths years, that is, about the end of the seventh year or grade. (Dr. Harris's last report (1879), p. 45, and letter from Superintendent Long.) "The average pupil will get one course, while perhaps a third more will get two courses" (p. 232).

The parts of the scheme bearing on the present inquiry, as printed in 1879, are the following:

The lessons are to be oral, given by the teacher for one hour on Wednesday afternoon. The subjects are, in the—

FIRST YEAR OR GRADE.

Plants, or outlines of botany.

SECOND YEAR.

Animals, or outlines of zoölogy and physiology.

THIRD YEAR.

Elements of physical nature.—First quarter: Air, wind, flying and swimming compared, pressure of the air, pumps, barometer, air pumps, pop guns, gases distinguished from liquids, gunpowder. Second quarter: Balloons, bubbles, heated air, chimneys, draft and ventilation, uses of water, water level, pressure of water, attraction in solids and in liquids. Third quarter: Water in the air, clouds, snow, frost and ice, heat and cold, communication or conduction of heat, effects of heat, steam, light, color, electricity, magnetism. Fourth quarter: Gravitation, motion of the earth, friction. Review of the year's work.

FOURTH YEAR.

Botany, more systematically studied.

FIFTH YEAR.

Zoölogy and human physiology.

SIXTH YEAR.

Physics and astronomy.—First quarter: (1) Gravitation and pressure (weight, pump, barometer, pendulum); (2) cohesion and adhesion (glue, paste, mortar, cement, &c.); (3) capillary attraction (lamp wick, sap, sponge, sugar, &c.); (4) mechanical powers (lever, pulley, inclined plane, wedge and screw, friction). Second quarter: (5) Heat

(5) heat, combustion, friction, effect on bodies, steam, thermometer, conduction, clothing, cooking, &c.; (6) light: sources, reflection, looking glass, refraction, spectacles, microscope, prism, telescope, effect on growing bodies, photograph; (7) electricity (lightning, sealing wax experiments, &c.); (8) magnetism (mariner's compass, horse shoe magnet, telegraph). Third and fourth quarters: Astronomy, forming a transition to—

SEVENTH YEAR.

Outlines of physical geography.

EIGHTH YEAR.

Outlines of natural philosophy (or physics) as illustrated in familiar objects.—First quarter: Matter and its properties, force, molecular forces, gravitation and weight, specific gravity, centre of gravity, motion, action and reaction, compound motion. Second quarter: Machinery, friction, strength of materials, use of materials in construction, hydrostatics and capillary attraction, hydraulics, pneumatics, acoustics. Third quarter: Heat and its sources, communication and effects: steam engine; warming and ventilation: meteorological instruments: thermometer, barometer, hygrometer, rain gauge, anemometer: classes of clouds: classes of winds; meteors and aerolites, aurora borealis: halos: circulation of water through the processes of evaporation: clouds, rain, springs, rivers, ocean, &c. Fourth quarter: Light: sources, reflection, prismatic spectrum: structure of the eye: optical instruments: telescope, microscope, &c.; electricity: magnetism: electro-magnetism; telegraph.

This syllabus is accompanied with remarks on its plan and the method of teaching it which cover several pages. The topics named for each quarter are not laid down to be rigidly adhered to; the teacher is to give ten lessons, and only ten, on the subjects named, choosing among them and changing the order if she wishes. As the teachers will vary in capacity and in experience, it is not possible to lay down an exact uniform scheme for all to follow.

In teaching, select typical objects or facts; give "every lesson so as to draw out the perceptive powers of the pupil by leading him to reflect on what he sees or to analyze the object before him. It is at first thought strange—although it is true—that powers of observation are to be strengthened only by teaching the pupil to *think* upon what he sees. The process is one of division (analysis) and classification, and, secondly, of tracing causal relations."

For preparation the teacher should fix in mind exactly what subjects she will bring up and just what definitions and illustrations she will give or draw out of the class, writing them down in a synopsis to be put on the blackboard. She should select passages to read and should bring in real objects when possible; but more stress is to be laid on a direct appeal to their experience, encouraging them to describe what they have seen and heard. Avoid giving too many new technical phrases at once, but do not use the loose common vocabulary of ordinary life only, which lacks scientific precision.

The reference books advised (for the teacher only) include, for the first course, only Hooker's Child's Book of Nature and Calkins's Primary Object Lessons; for the second course, Hotze's First Lessons in Physics for method and Wells's Natural Philosophy for information;

for the third course refer to Wells's, Tate's Natural Philosophy, Brande's Dictionary, &c.

Whenever possible in other studies refer to subjects that have been studied in science. The pupils above the fifth grade should write compositions weekly on the oral lessons, illustrating them by diagrams and pictures.

Relieve the hour's work as much as possible, firstly, reading and explaining something adapted to the capacity of your pupils; secondly, drawing out in a conversational manner the experience and information which your scholars already possess on the subject; thirdly, exhibiting the visible objects which you or the pupils have brought to illustrate the lesson, and requiring the pupils to notice and name the properties, qualities, parts, and attributes; fourthly, never omitting to show by a synopsis on the blackboard what has been discussed in the lesson, its classification and relation.

A few lines from the report to the board will complete the picture of what was aimed at:

The important question to be settled was, how to bring in those lessons so as not to distract and dissipate the attention of teacher and pupil from other work. * * * Accordingly, instead of introducing these lessons daily, they were confined to one afternoon of each week, and sufficient time given to each lesson to allow a deep and lasting impression to be made; whereas, in ordinary lessons the pupil is required to be so intensely active that he cannot sustain the exertion for more than thirty minutes; in the natural science lesson he is to give his attention for one hour, but the teacher is so to vary the lesson that the class shall be able to do this without excessive fatigue.

It seems to me that this phase of the subject—its value to the teacher—is worth quite as much as the immediate value of these lessons to the pupil. * * * In that lesson the teacher is led to probe in a freer manner than ordinary the miscellaneous fund of experience possessed by the individuals of her class; thus she cannot fail to find new means of getting hold of pupils in each of the regular branches of the daily course. (Report of 1871, p. 175.)

The excellence of the oral method should be its freedom from stiffness and pedantry and its drawing out of the pupil to self activity in a natural manner. Its abuse happens when in the hands of a poor teacher. * * * There is too much pouring in without enough exercising the pupil by making him do the reciting and explanation. The excellence of the text book method consists in getting the pupil to work instead of working for him; in teaching him how to study for himself and to overcome difficulties by himself, instead of solving them for him. (Page 180.)

Originally, as will be seen, a full hour weekly was to be given to these lessons; but from the report of Superintendent Long in 1881, as well as by letter from him, it appears that the time has been reduced to twenty-five minutes during the first course and to thirty minutes during the later years. Dr. Harris writes:

It was essential that there should be one lesson a week, and that *an hour long*, so that the teacher was *obliged* to vary the lesson and could not turn it into a *cram*. The teachers themselves became acquainted with nature and were aided wonderfully by it. * * * The scheme was working well when I left [in May, 1880]; the children showed the insight they were getting into *nature as a whole* by their intelligence in geography lessons and in history and literature as well.

In the high school Norton's Natural Philosophy is studied by students of all courses through the second year.

CHAPTER IV.

DISCUSSION OF THE REPLIES.

In the following chapter we have to combine, if possible, into a somewhat systematic whole the many opinions and records of experience from home and foreign sources that have been given in the preceding pages. A great part of the value of what has preceded depends on the fact that there is so much repetition in it; that thought and experience have led so many men to similar conclusions; if this were not so, it would be hopeless to expect any sort of uniformity in the teaching of physics. At the same time there is such divergence of opinion on some points as to show that any proposed uniform scheme must be quite elastic. The attempt will be made to discover the scheme that is favored by a majority of the replies, giving reasons for each of its details, and the objections to it so far as possible, and considering it from various points of view. It is for the reader, not for the present writer, to judge whether this general average of opinions does fairly present the ideal course of study and whether it is practicable in any given case. Constant reference must be made to the tabular statement; the extracts from the replies will usually be given without quotation marks, a number in parenthesis referring to the number prefixed to each reply; but obviously it is impossible to credit to each one of the hundred writers every thought or even every expression due to him. It should be remembered that this discussion does not refer to ungraded country schools, nor to industrial or technical schools; it considers physics as a branch of an education that is liberal as far as it goes, whether classical or non-classical, whether extending through many years or confined to only a few.

I. SCIENCE IN THE SCHOOLS.

That some study of nature is an essential part of any liberal education has been stated for centuries by the great educators almost as if it were an axiom to them. In 1793 a decree of the French minister named, among the subjects to be taught in the communal schools, the mechanical powers, weights and measures, and other scientific subjects.

Those who at present object to introducing science into courses of study urge the great danger of overcrowding the student, of dissipating his powers and distracting his attention by a variety of studies. It should not be denied that these results have happened; so it becomes necessary to make a choice between the many sciences in which the

student may become interested, and to select one or a very few for more thorough study, and to see to it that these chosen subjects come at the proper age and are profitably taught.

In the earlier work the choice is not so important, but almost invariably physics has been one of those chosen for the high school work. It is generally agreed that botany should precede it in the course, but among the other sciences no one could secure more than a plurality of votes; if others are to be taught in a school, local causes would usually determine which: e. g., the interest or previous training of the teacher; the collections the school may have acquired; the character of the community, as in a mining country geology or mineralogy or chemistry might be chosen. Some of the extracts in the last chapter have been quoted for the purpose of helping toward a correct appreciation of the relative place of physics among the scientific studies. See especially the quotations from the British Association report (pp. 98, 99), Professor Payne (pp. 101–103), and Mr. Wilson (pp. 103–105).

II. REASONS FOR TEACHING PHYSICS AND THE ENDS TO BE SOUGHT.

But by the teaching of physics in the schools, as distinct from the colleges, what are the ends to be gained, what the reasons and aims underlying any intelligent advocacy of it? Some of them are common to most scientific studies, others peculiar to physics.

The first answer we quote from an excellent little English manual on The Cultivation of the Senses:

> The object which the teacher should set before him in teaching any physical science should be (1) to let the facts speak for themselves; (2) to supply suitable experiments and specimens for the establishment of general laws; (3) to secure accuracy and solidity in the knowledge acquired; (4) to connect scientific principles with their practical application; (5) to sharpen the observing powers; (6) to cultivate the imagination in the apprehension of theories where proof is not available; (7) to exercise the reasoning powers; (8) to form good intellectual habits. (Page 75.)

The royal commission of 1870 say:

> We are not prepared to assert that the mere communication to the mind of the pupil of the facts of science would contribute very materially to the training of his intellectual powers, although it may supply him with much valuable information, and may render him the still more important service of awakening his desire for further knowledge. But the true teaching of science consists not merely in imparting the facts of science, but in habituating the pupil to observe for himself, to reason for himself on what he observes, and to check the conclusions at which he arrives by further observation or experiment. (Ante, p. 92.)

The committee of the British association in 1874 say:

> We have assumed, as a point not requiring further discussion, that the object to be attained by introducing the teaching of physics into general school work, is the mental training and discipline which the pupils acquire through studying the methods whereby the conclusions of physical s ience have been established. (Ante, p. 99.)

Professor Foster says that the study of physics trains one to find out the truth and to state it accurately: "This study tends specially to develop the power of thinking definitely and correctly." (Ante, page 95.)

Mr. Worthington reports that the study has, even on the mass of boys, an unexpected influence, as much moral as intellectual, which is shown in an increased and increasing respect for precision of statement and for that form of veracity which consists in the acknowledgment of difficulties. (Page 100.) The thought common to the last two writers is in the line of a portion of Mr. Ward's address quoted on page 103.

In the replies to question 9 it is generally stated that the study trains the observing powers, and many of the reasons already quoted are given, though, of course, quite briefly. It is further said, the information is such as all need (2); a knowledge of physics is necessary for understanding other sciences (18); the knowledge of physics makes men better able to live well and increase the comforts of life (5); a knowledge of physics, somehow gotten, good or imperfect, systematic or confused, underlies our whole life, and enters, directly or indirectly, into all practical arts and professions. Sound information in regard to it, therefore, is of primary importance. At the same time its proper study trains our senses, our powers of observation, our reason, and our taste (56); daily toil will be more pleasant if the reason why is known (60).

The aim of this study is to enable the pupil to study for himself all his life (25); children should be made to see that truth does not depend on the simple authority of some author; they should catch the spirit of inquiry and learn how to observe, compare, and draw conclusions of themselves (26). Experiment early, because it is fascinating to the young, a relief to memorizing Latin grammar (27). Its aim is to cultivate observation, to stimulate inquiry, to provoke invention, to open new fields of investigation, to suggest possibilities of occupation other than business or the professions (39); to train the mind to habits of accurate observation and of precise and clear reasoning (51); to cultivate the habit of attention to experiments and training in distinguishing essential from non-essential conditions (53); the study aims at the discipline of the mind, the acquisition of information-(secondary in importance), and some degree of familiarity with experimental methods of investigation, to the end that the student may comprehend the scope and limitations of this method. The absolute accuracy of mathematics and the uncertainty of observation are brought together in this study (61).

Physics should be taught in lower schools, that when the pupils come to the high school they may have that slight familiarity with terms and ideas that will aid their work materially. For the same reason the college work is much more profitable if the student has laid a foundation in the preparatory school. Above all, it should be taught in each kind of school for the benefit of those who will go no further. This is one of the points strongly urged in the St. Louis scheme. (The advantages of inductive training will be considered a little later.)

It need not be assumed, as is apparently done sometimes, that none of these benefits can be given by non-scientific studies; the argument should rather be that greater returns for the time expended will be ob-

tained by taking up a scientific study for a moderate portion of the time than by keeping the student exclusively on language and mathematical work, with geography and, perhaps, history. The training will be somewhat different, and at least as valuable for the time expended on it, and in good schools much more valuable. The information will be useful, and the study will be a powerful aid in cultivating the general intelligence and in giving a wider, more liberal outlook on the world.

Of course these many benefits will be realized only in part; they are in the same sense ideals as are the ends of a liberal education, often presented in glowing terms, but which many a graduate regretfully or iconoclastically declares his training has not enabled him to reach. Yet, toward some at least of these ideals teacher and student alike should consciously strive, and toward them conscious progress must be made, otherwise the study is unprofitable and should be dropped.

III. THE METHODS OF TEACHING PHYSICS.

The weight of opinion is decidedly that at first the teaching should be inductive. That it should or can be done without any use of deduction would probably be asserted by no one, and undoubtedly advanced work should be largely deductive. Still, some persons may object to this name for the method, because in practice the mental process of induction can hardly be unassociated with deduction, and other persons will feel that the difficulties in the way of carrying out the method consistently are insuperable.

It is well to recognize what these difficulties are, even in the case of teachers of good ability, fairly supplied with apparatus: First, the absence of any clearly held and generally accepted view of either the importance or the method of inductive training. The teacher has probably known little or nothing of it in his own education, and however firmly he is convinced of its desirability he does not know how to begin. If, as is likely, he has also to teach mathematics, he is specially familiar with deductive methods and their value in training. Again, the progress of the student following this method is so slow, if measured by the usual examination tests, as to discourage a faint heart; for the method is better fitted for individual students than for classes. It is sometimes carried to such an extreme (at least on paper) as to confine the student's knowledge to what he can learn for himself—a revolt against the popular idea that education is a process of acquiring information so conspicuous as to meet with popular condemnation; indeed, the common advocacy of scientific studies for the value of their information makes it more difficult to follow a method in which information is a subordinate end. When pushed to the extreme just indicated the method breaks down utterly; for quantitative experiments are mostly beyond the reach of high school boys, and yet very few principles or laws can be established without them.

But these difficulties and objections are not insuperable; the first of them is the most serious and is obviously accidental, not inherent. We shall take some steps toward overcoming them if we can understand what the scientific or inductive method is and its importance, in how far it is fitted for school purposes, and to what extent books may be used in connection with it.

In the introductory chapter a few words have been said about the five principal ways in which we acquire truth that is new to us and the three methods of teaching (pp. 12 and 13). In the teaching of physics, a part or all of them may be used. The book or the teacher may (5) state dogmatically some principle or law from which the student can (3) deduce some consequences and either (1) observe phenomena accurately or (4) perform an experiment to illustrate or prove his conclusion; thus every one of the five ways is used except the second, the method is a deductive one, and the training of course is not valueless. More often, however, the deduction is made in the book and the results of the experiment stated also, so that the pupil's thought is stimulated very little and the whole work is entirely dogmatic.

But an inductive method of gaining truth or of teaching is one which includes and lays stress upon the remaining step: induction. Any or all of the other four processes may be used also, but the name-giving, vitalizing thing is the induction of the principle or law by an active mental operation, instead of the passive reception of it from authority, or from a priori considerations, as the ancients did. Following the scientific method we first observe the phenomena sharply and then seek for a cause or for the law according to which the forces act. A dozen guesses may be made quickly, perhaps to be found insufficient. But, if the guess is a definite one, definite conclusions (deductions) can be drawn from it which will lead to new observations or experiments. Perhaps our supposed law is immediately disproved; then we make a new guess, and so continue until one explanation remains that is consistent with all our knowledge and stands all the tests we are able to apply; and now is the time for us to consult the published record of other men's experiments and in this way learn those facts that are otherwise unattainable by us. If to reason accurately on physical facts be of any value to the student, is not a conclusive disproof of an hypothesis (provided he originated it) more valuable than the incomplete proof with which he must usually remain contented when he learns the accepted hypothesis? It is commonly a waste of labor to "slay the slain," e. g., to disprove the corpuscular theory of light; but when the student has thought of it as a possible explanation, or believes that a floating cask is lighter because of the air it contains, or that the apple does not attract the earth, it is worth more to him as a training to understand by direct proof (or by analogy, if proof is impossible) that his position is untenable than to have the truth set before him in the ordinary didactic way.

While deductive processes, therefore (and especially mathematical ones), are really the tests of the supposed principle and may also furnish many new facts which would probably never have been known otherwise (e. g., optical phenomena), the source of the facts is really the little guess, at first unworthy the name of principle. These little thoughts are the seeds from which most of our science grows, the springs from which it flows in an ever-widening stream. It is just because deductive reasoning is so powerful, so fruitful, that the clear formulation of a fairly tested new principle is of so great value. Nothing can be simpler than Archimedes' principle, few things are more fruitful.

But why should every student spend time in inductive training any more than in acquiring the facts of medicine or law? Because it is preeminently fitted to discover the truth, to stimulate the love of the truth, and to gain those allied ends in education pointed out by Mr. Ward in his address quoted from on page 103. Because, consciously or not, we must use inductive methods all our lives in ways where we cannot avail ourselves of the principle of division of labor, depending on others. The professional opinions of the physician and lawyer, all our judgments of men, and our opinions on common matters of life must be largely the result of inductive reasoning.

Another reason for introducing inductive training into the schools is that in the opinion of many teachers more of physics can be taught so as to be remembered in this way than in any other.

It is clear that at present the only school training which the student can receive in this method is by means of the sciences, especially physics. However possible it may be to begin the study of Latin, for example, on this method and to allow the student to make his own rules as he needs them, such teaching is very rare and of doubtful value.

Now, remembering the limited time, maturity, and mathematical preparation of the students in our schools, can one hope to make training in and by this method of much value, especially in the study of physics? Nearly all the writers of the replies advise it, and one cannot believe that they are advising so unanimously an impracticable scheme. Foreign writers too are very unanimous in urging it. In this connection the reader should refer to some of the extracts in Chapter III, especially to Oberlehrer Maier's remarks about the developing method (pages 79 and 80), and the extracts from Professor Payne and Mr. Wilson (pages 101–103, 103–105), which are too long for requotation. The Socratic method which is advocated by so many teachers of experience is really the inductive method put in a form suitable for teaching.

The most difficult question of all is how the method is to be put in practice in schools. What has already been said, and especially the extracts just referred to, show what the spirit and general method of inductive teaching must be, and this is all that can be done here; to attempt more would be to usurp the function of the text book writer. A single model lesson would be of little use, for the writer of it would

be sure to choose a specially favorable topic. A very interesting suggestive model lesson is given in a child's story by R. W. Raymond, entitled "The art of asking questions." More extended models are found in Mayer's, Tyndall's, and some other books. But it should be observed that the introduction of laboratory work does not necessarily, nor usually, make the course an inductive one.

The use of text books of the ordinary kind, however accurate and clear, is inconsistent with, perhaps almost fatal to the scientific method in schools, as is said elsewhere. The plan presented by Mr. Osbun, then of the Salem (Mass.) Normal School, in an address before the American Institute of Instruction in 1881 and elsewhere, may meet this difficulty, if it is ever developed into a complete book. Here the text furnished to the student describes only the *experiment* and fills a column one-third the width of the page. The pupil follows its directions, makes his *observation*, and draws an *inference*, and if these are approved by the teacher the pupil writes them in the second and third columns; from time to time a "general inference" is drawn. Obviously, the value of such a book depends on the skill with which the experiments are chosen.

The book which is the most conspicuous example now in the market of this inductive method is Gage's. Here, although the principles and laws are stated, the experiments have preceded them; many questions are asked in connection with the experiments that tend to make the student active, not passive, and allow him to think for himself before the answer is given, if it is given at all. Some teachers express a doubt whether a more exclusively inductive method is desirable.

Where the teacher desires to prevent the student from learning the principle out of a book, he may, of course, dispense entirely with books; but much time will be saved by furnishing the student with leaflets describing the experiments, especially if laboratory work is introduced. A very valuable help would be given if some experienced teacher should be inspired to prepare cheap leaflets, not stitched together, for a brief inductive course. From these each teacher would select topics in such order as he might choose for a course lasting one, two, or three months, distributing the leaflets only as they were needed. The inferences must be easy ones for the pupils to make. The subjects might be so chosen as to include some things in heat and electricity in the briefest course, and the order of subjects would not be very important. It is hoped that such leaflets might stimulate many teachers to try the method for a short time in the easiest way and see how it works, but afterward take up a text book for the rest of the year to secure a more logical treatment. Thus the opposition of the conservative class in any community would be largely averted, since the use of the text book is only postponed for a few weeks. The cost would be but a few cents for each pupil, and no trouble would be occasioned from an attempt to change text books. The most enthusiastic advocates of inductive

training may remember the proverb "Despise not the day of small things." A score of teachers would try this brief course to one who would boldly cut loose from the traditional methods; and, unless past experience is deceptive, the more one teaches by the inductive method the better he will like it.

One difficulty in the way of introducing non-dogmatic teaching into the high school may arise from the work in earlier grades. If this has really succeeded in planting in the boy's mind any principles, his memory might be stimulated rather than his thinking powers when he comes to later work. This difficulty is, perhaps, remote, and is mentioned only to emphasize the desirability of having the work of the different grades pretty sharply marked out, so that what is done may be done thoroughly, and higher work may not be anticipated in any spirit of unwise ambition.

The replies, as a whole, give the impression that this inductive method may be used with especial success with pupils about the ages of those in high schools. Two of the replies speak of the good results obtained by following it (25 and 58). With older students there may not be the necessary freedom in answering questions; but some of the spirit of the method may be retained by showing the experiment before pointing out what it is to teach, by calling attention to familiar phenomèna, or describing such as cannot be shown, without at first stating the essential thing in the experiment or the underlying principles. Sometimes it will be profitable to put before the student, on the blackboard or by oral questions, such schemes of alternatives as will help him more quickly to make the desired classification or to discover the hidden principle; such is the familiar construction of botanical tables. When the principle has been grasped, even indistinctly, it may be used as a basis for deduction and ultimately be stated with sharpness by the teacher. After the student has become somewhat expert in the method of discovering principles, more rapid progress may be made by sometimes stating dogmatically the principles; then use them as a basis for deduction, and show by experiment or otherwise that the predictions are fulfilled, or point out useful applications or instruments depending on the principle. Here it must be remembered that school room experiments rarely *prove* a principle or a law; they illustrate it, make its meaning understood, and serve as samples of the complete proof.

If any one thinks these views have always been recognized in teaching, let him examine the older text books on the subject, for example, Enfield's Institutes of Natural Philosophy, published in 1783. This was revised by Professor (afterwards President) Webber, of Harvard College, and in 1820 the third American edition was called for. Every chapter begins with definitions; there follow propositions numbered and stated in a formal way with mathematical proof, while corollaries,

scholia, and lemmas are as frequent as in a geometry; the experiments are referred to as the results, not the beginnings, of the investigation. Many profound treatises of to-day on mathematical physics have a less profound appearance than this book, which seems to have been a standard one in New England colleges. Even among our modern school books, however good they may be in other respects, there are few that would not practically prevent in the schools where they are used the use of the inductive method; a book of puzzles keeps question and answer on separate pages; a text book on physics will probably give the answer before stating the question.

In this discussion little has been said about the applications of physical principles and the thorough study of instruments; these are not characteristic of any method; they are the "central things" of the school work (compare pages 80 and 81) and are not likely to be overlooked by any teacher.

In conclusion, one suggestion may be quoted, that if the inductive method has been followed it may be found profitable in the review to follow a deductive, logical one, and the converse proposition may be true; certainly the review should present the facts in new relations and grouping.

IV. LABORATORY WORK.

The replies tabulated under questions 3 and 7 show that practical work in the laboratory is generally favored, both in the high school and college. Some of the replies do not make clear whether work by the student is meant or by the teacher, and the approval is very often qualified by adding "if possible," "if practicable," &c. One teacher in a normal school writes that he is in favor of a physical laboratory and of much emphasis being placed upon personal investigation and experimentation on the part of each pupil. It is more valuable than all things else in the study of physics. An actual verification of a statement is more satisfactory and profitable than many times as much theoretical knowledge (15, Q. 8, 10.)

Several replies object to this kind of work in the high schools, but the only reason given comes from one of the colleges and deserves careful attention. In the higher schools students are put to experimenting when unqualified for it and with inadequate means. Thus habits of slovenly experimenting and inconsequent induction are formed, or the student is disgusted with the unsatisfactory nature of the whole thing. To put others than special students into laboratory work is a waste of time and an injury to the student. Especially is a loose way of experimenting with cheap apparatus and obtaining only the remotest approximation in results—results which would not of themselves suggest the law—very much to be deprecated (50, Q. 8, 9).

The opinion of the English writers is almost uniformly in favor of laboratory work. The royal commission (p. 92), the British Association

committee (p. 99), and Professor Foster (pp. 95, 96, 97, 98) all advocate it; Dr. Wormell (pp. 100, 101), Mr. Claypole (p. 101), Mr. Steele (p. 101), and especially Mr. Worthington (p. 100) give the results of experience in this mode of teaching, all favoring it; several of them advise quantitative work.

The first practical work of the student will probably be in repeating experiments shown by the teacher; then new and simple experiments will be assigned him, and some work at home, till finally he may be led to devise experiments that will illustrate a principle or help to answer a question. In the normal schools the student is often required to make much of his apparatus, but in other schools this will probably not be as advisable. In some schools the home work will be scarcely possible, such as boarding schools or academies; here opportunity must be given in the school rooms for most of this work, even if it be of the simplest kind, not needing supervision.

All laboratory work in grammar or high schools will be likely to accompany the study of the text book or the use of something like the proposed leaflets, and so will follow a consistent order, its purpose being in part to make clear the ground covered; so the experiments will be largely qualitative; but such determinations as specific gravity, the pressure of the air, the focal length of a lense, &c., are not likely to be omitted, and experience will doubtless lead, as in England, to making the work more and more quantitative.

With regard to the colleges the majority of the replies to question 7 advocate elementary laboratory work accompanying the ordinary class work. If by elementary is to be understood work similar to that of the high school, it must not be as simple, or the student may acquire a contempt for it. Several writers, however, advocate the more common plan of admitting to practical work only those who have gone over the ground covered by the lectures. In the earlier days of American laboratories a large part of the practice consisted in the use of simple apparatus; but, as the equipment has increased, as well as the experience of the directors, there is becoming more and more marked a tendency to insist on a comparatively profound experimental study of a very few questions, using for reference special memoirs, &c. The European laboratories are patronized rather by specialists than by such students as are now under consideration. In some of them consecutive courses are arranged, as in M. Desains's laboratory at Paris, of which a good idea is given in the excellent manual by a former student, M. Witz, of Lille, and also in the Cavendish laboratory, Cambridge, from which a manual is promised soon. It is not within the province of this discussion to consider the kind of work fitted for the few who will make a specialty of physics: their experimental training will of course be broad and deep and extend through several years; but for the average college student nearly all the replies to question 7 advise some elementary laboratory work accompanying the text book work, and to determine the character and

extent of this a general discussion among the professors of physics in the colleges as to methods and results is very desirable.

Under the titles laboratory or practical work so much is now included that the names have become somewhat indefinite in meaning; so the following classification is suggested, in default of a better one, to aid in definite thinking: obviously in practice the three classes will merge into one another to some extent:

(1) *Normal or instrument making course*, such as is especially advocated and practised in normal schools and advised in several of the replies, giving familiarity with the making of apparatus as well as its use. Mayer's Sound, Mayer and Barnard's Light, and Weinhold's Experimental Physics are among the best books for this work.

(2) *Elementary laboratory course* (*practice or work*), accompanying the class room work, never being far in advance of or behind the topic of study in the text book. The apparatus will be simple, but in most cases ready for the student's use. This is the course that is generally advised for high schools, and for colleges also, for the average student, if the brief replies to question 7 are rightly understood. Gage's Physics is especially intended for this sort of work. If introduced into college it will naturally be more quantitative than in the high school, and probably more in the nature of a verification of a principle or law than for the purpose of furnishing the facts from which the law is to be inferred; still the wisdom of making such a difference is open to question: if the student has already had such work it is better that he should go on to course 3 instead of repeating or continuing it. But anywhere to deserve its name this second course should be qualitative in the main, consecutive, accompanying the text book or syllabus and following its order.

(3) *Physical measurements.*—As its name implies, this course is quantitative in character, whether for beginners or advanced students, and does not belong to the secondary schools, except to the very slight extent elsewhere suggested. Very few persons would advise its introduction till after the course of lectures in college. In the time ordinarily given to the work the whole ground cannot possibly be covered, and the tendency is becoming more marked to confine the student's work to a very narrow range. Obviously under this head comes the advanced work of special students. A union of courses 2 and 3 is advocated in Trowbridge's New Physics for higher preparatory schools and colleges, which has just appeared. (Compare also page 125.)

It is very much to be desired that the expression laboratory work may hereafter be limited exclusively to work performed by the student and not be used to include demonstrations by the teacher.

Those teachers who for any reason are not ready to introduce the laboratory method into their schools may find profit in providing a few cheap balances and weights, measures of capacity and length (both metric and English), and in drilling the classes in arithmetic and elementary physics in the use of these. Various simple determinations, includ-

ing density and specific gravity, may be made by the pupil with great advantage. It is to be hoped that all schools may follow the example of the few in this respect. So, too, the simpler meteorological instruments may be observed and a record be kept by the pupils in turn each for a few days.

V. THE TEACHER.

Many of the replies emphasize the difficulty of getting proper teachers for this subject, both for the schools and for the colleges; for the teacher should have a knowledge far exceeding the amount he must teach, a training in methods of teaching, and a manual skill in making and using apparatus that is called for in scarcely any other subject; otherwise mistakes in method and fact will be common in his teaching and his instruction will be a constant appeal to the text book or other authority, thus losing the very thing that is of peculiar value in the training derived from the study of the sciences. In such cases little information is really gained or retained, and as the study is not vitalized by an appeal to nature the phenomena are not understood or are misunderstood, and the results for good are slight; even the time may be worse than wasted, for it is difficult for future teachers to undo the harm of bad training.

But as the demand for better teachers increases the supply will increase; this has been the result in England, according to the Commissioner of Education (Report for 1881, p. cxxx). On the part of teachers generally the knowledge of physics is increasing, thanks to our normal schools and the rising standards of teachers' examinations. The instructor who is competent will be compelled to practise a restraint that is sometimes galling, communicating from his stores of knowledge only what he is sure can be assimilated, "organized" by his pupils.

It is well known that the training in normal schools and in teachers' classes at colleges aims largely to give a knowledge not only of facts and their presentation but of the points of special difficulty and the construction, repair, and management of apparatus. On these latter points not much is to be gained from ordinary text books, although more and more such things are being added to them, as the ideals of physics teaching are changing. The books of Mayer, Tyndall, and Gage, referred to in the replies, pay special attention to such work, and several others are reported to be in preparation. Professor Guthrie at the Normal School of Science, South Kensington, London, has worked out an elaborate scheme of apparatus-making for quantitative work. The directions are printed for students' use only, but many of the details can be found in Guthrie's Electricity and Magnetism, his Molecular Physics, and his official Outline of Experiments.

Teachers' handbooks are of course familiar, but two or three of them deserve mention here, though they are already widely known: Frick's Physical Technics has run through several editions in Germany, and in this country a second revised edition was published a few years ago. Weinhold's Introduction to Experimental Physics will be of value,

especially to those who must make anything beyond the simplest temporary apparatus. A more recent book by the same author (not yet translated) will be, for those who read German, probably the most valuable of the three. It deals with the arrangement of the lecture room and table; with the use of apparatus in demonstration, the best forms of it, and how it is to be kept in order; what should be shown, and similar practical matters. If the teacher has not found a reference book that suits him he may be referred to the latest editions of two books that have been standards for more than a generation, Müller's Lehrbuch der Physik and Lardner's Natural Philosophy.

The establishment of a uniform progressive course of study in physics would be of great value to the teacher. Without unduly hampering him it would so map out the general features of his work as to free him from much responsibility and wasteful experimental teaching. It would promote an esprit de corps that would be invigorating, and the teacher would recognize his responsibility for doing only a part of the work; and so to some extent it should prevent the criticism before the class of the work of other teachers, whether in higher or lower schools.

But, whatever be the teacher's abilities and spirit, the best work cannot be done unless the school authorities, superintendent, principal, and board, coöperate with him, furnishing him apparatus, suitable rooms, and time for arranging experiments.

VI. PHYSICS IN PRIMARY SCHOOLS.

Passing now to matters relating only to a single grade of schools, we have first to consider the replies to question 1, Do you think it desirable to introduce into primary or grammar schools any study of physics? If so, to what extent and of what character? With or without books? Can this serve as a basis for future work? and the results and opinions given in answer to questions 8 and 10. A discrimination is not generally made between the primary and grammar schools, so there is some uncertainty in combining the replies; but the following seems fairly to represent the average of opinions:

Through the primary years, say up to the age of eleven years, let there be given oral lessons on science, at least one hour a week. Opinion is divided as to whether the work should be a few minutes daily or longer but less frequent exercises. The latter plan, when not burdensome to the children, is likely to be the more profitable to the teacher and is urged in the St. Louis scheme. A little of this time, perhaps one-fourth of it, may be given to the simplest, most familiar phenomena of physics. The French and the St. Louis schemes are quite detailed and have been given already (pp. 74–76, 111–113). The work will consist of questions and talks by the teacher, but the pupil's activity must be awakened to use what he knows already, sometimes what he can learn by inquiry at home, before the teacher gives information. The continual telling, which is injurious enough in any study, has been

the curse of object lessons and oral teaching in many of the schools, and was unsparingly condemned in the report of the committee of the American Association, which should be referred to in this connection (ante, pp. 105 and 106). The various manuals of object teaching may be excellent servants to a competent teacher, but are poor masters—very poor, if we may believe the recent criticism of a London journal. Even in the earliest work in physics the lessons should be somewhat consecutive, not taken at random; they should deal with the child's toys and the simplest phenomena, little with theories. A very few experiments may be introduced to give zest to the study and to help toward a correct idea of how to gain new knowledge by experiment.

VII. PHYSICS IN THE GRAMMAR SCHOOLS.

In the grammar schools physics should be taken up in a more thorough way. The tabular statement shows that few writers advise the use of a text book. Hooker's Child's Book of Nature is often used as a reading book; Stewart's Primer of Physics is advised by several and is used in many schools; several advise the use of the larger books of Steele, Ganot, or books on the Mayer and Tyndall plan; but do not prejudice the student by an unsuitable book (18). Some training should certainly be given in the use of reference books.

The work is still largely oral and very elementary, few schools being able to reach the standard of the Boston grammar schools. In some schools the leaflet plan already described may be helpful or other means may be used to secure inductive training. The lessons will deal with common phenomena and instruments, showing how man uses the powers of nature; for it must never be forgotten that the great majority of students will not go beyond the grammar school or even complete its course: for 100 children in the lowest class in the Boston grammar schools there are 19 in the highest class and 8 in the lowest class in the high schools (report, 1879). Obviously, therefore, everything that is possible should be done to make the work "practical" as far as it goes, provided always that the most essential thing—the training—is not thereby sacrificed and that the work proper to the high school is not anticipated. Experiments are important; these must mainly be qualitative, but should give familiarity with the *use* of common instruments: for example, the thermometer, barometer, hydrometer, balance, clockwork and its regulation, simple mechanism, the reading of a gas meter, the telegraph, &c. A few replies advise laboratory work. All the science work may be made tributary (but must not be subordinated) to composition writing on the blackboard or paper and to similar language work. Full notes should be written at home, perhaps be corrected by classmates, and finally be revised by the teacher. Frequent reviews will not be forgotten, with new groupings of the facts. In the Cincinnati schools of this grade the examinations are required to be oral.

If properly done, even this rudimentary work will give a little invaluable training in the precise observation and correct interpretation of phenomena; it will also cultivate the general intelligence of the pupil; give him some training in exact thinking and expression; give some fundamental information and a few categories or pigeon holes for the sorting out of future knowledge, and probably a taste for future study in this subject; to this extent it is a valuable basis for future work, although the same ground must be covered in later study in a more systematic way if the student has the opportunity for it.

With reference to this grammar school work, the Commissioner of Education says:

> The endeavor to make elementary science a feature of these grades has revealed the same difficulty in this country that eminent English scientists have pointed out in their own, namely, the want of teachers prepared to give the instruction. The lifeless routine of memorized recitations is worse than useless; it paralyzes the faculties by which the facts of science are apprehended and renders true progress impossible. (Report, 1881, p. cxv.)

In some cities, as Boston, special courses in science for teachers are arranged, and the summer schools of science may do something toward supplying the needed training, but the main dependence must be on the normal and the secondary schools.

VIII. PHYSICS IN THE SECONDARY SCHOOLS.

The tables show in a summary way most of the replies to the questions relating to the work in the high school; but whether these answers are given as a maximum or a minimum, with hesitation or positiveness, can only be learned by consulting the full answers.

Time to be devoted to physics.—The time to be devoted to this subject in the secondary schools must depend evidently on a variety of causes: whether the subject has been taught well or ill in the lower schools; whether the school is mainly a preparatory one or otherwise; whether the teacher is thoroughly competent; whether laboratory work is to be done, either at home or in the school, &c.

Several teachers advise giving considerably more than the equivalent of 200 hours to the subject. The number of those who think 200 hours the proper amount and of those who think it to be too much time is nearly equal. The average opinion would probably advise this time in most cases, but would shorten it for students who are preparing for college. The preparation required for Harvard (classical students only) takes about two-thirds of a year, judging from the replies of five fitting schools (19, 26, 27, 29, 48). The study comes in these schools usually in the third year. In New York the schedules suggested by the regents of the university assign to it two-thirds of a year, as we have already seen, but the number of hours a week is not specified. In Michigan, where the university is a part of the school system of the State, a conference between committees of the faculty and of the city superintend-

ents resulted in requiring of non-classical students seeking admission to the university a year of daily work in physics, and in nearly all the larger high schools of the State the full time is given to the subject.

Year of the course.—The year in which the study should come is pretty generally stated to be the third, apparently because geometry is not usually begun before this year. The suggestion in some of the replies that part of the subject be taken in the first year and the remainder in the third or fourth, with a review and fuller treatment, especially in mechanics, deserves careful consideration, particularly for those students who have had no physics in lower schools. The fundamental ideas and ways of looking at the underlying principles of the subject are so new to the student, and need so much time to grow into shape and to have any real meaning (as any teacher must know from his own experience as a learner), that there is much to be said in favor of spreading the study over a considerable time if other interests are not sacrificed thereby; as, three hours a week for a year, instead of two terms daily.

In those divisions of the French lycées corresponding most nearly to our high schools, though the pupils abroad are somewhat younger, the study runs through four years, with one to one and a half hours a week. In the German Gymnasien (classical schools) two hours a week through the last four years are given to physics, and still more time in the non-classical schools. (Compare pages 74, 76, and Table II, p. 158.)

In England, too, it is a common practice to break up the study through two or more years; but there seems to be great danger, as the work is managed there, of having no connected science of physics. The English text books are commonly fragmentary; however perfect in themselves, they appear to treat their subjects as if they were independent sciences, not parts of physics, and the epoch-making book of Balfour Stewart has by no means cured this evil. Sometimes we hear teachers express a desire to use, instead of a single book covering the whole ground, five separate books by various authors; but unless the teacher has an unusual grasp of the subject the effect of so many modes of treatment must prove distracting to the student.

The character of the work.—The prevailing character of the work is generally described as elementary and beyond all question experimental; some of the replies are as follows: Objective and experimental followed by study of a text book (4); it should aim to give clear views of the most important principles in all departments of the study and should open the way to further study (18); simple, practical, not attempting too much (23); largely descriptive, but to some extent mathematical (24); there should be a constant application of principles to common life (25); where possible, let the experiment precede the book study (26); thorough and accurate, forming habits of careful observation and induction (50); first, the acquirement of the true method of studying physics; second, a complete understanding of and entire familiarity with the leading principles and facts; the course should be such as is

laid down in the latest and best text books, such as Gage's, Avery's, &c. (54); such as to give familiarity with the more important phenomena and laws deduced from them (55); the same as in the primary, but giving more prominence to the deductive part and the working of good problems (56); accurate (65); in part quantitative, but mostly qualitative (67).

The majority of the replies and the emphatic English opinions already quoted advise that the teaching should be inductive rather than deductive (the statement of principles and laws and of formal definitions coming after the experiments rather than before them and being elicited so far as practicable from the student) and primarily for discipline, since more information can be retained and made useful if the mind be disciplined than if the mere information be the end of the study; of course in an industrial or technical or professional school the clearly seen utility of the knowledge will aid in fixing the facts in the memory. The few who dissent from the majority give no reasons for their opinions, so the subject may be left with a reference to the discussion of methods a few pages earlier and with two quotations; the first is attributed in a newspaper scrap to Huxley: "Of all the fetiches that men worship none is more powerless than mere information;" the second is De Morgan's remark: "Nothing flies so quickly as half digested knowledge, and when this is gone there remains but a slender portion of useful power."

Text books and the informal lecture may be regarded as indispensable, at least for part of the course; only two writers dissent. The book should be accurate, fairly up to the times, not sensational, small rather than large, and be written by an experienced teacher. But many of the writers condemn a slavish dependence on the book as an authority and the too common unscientific habit of memorizing it. Some would print only the experiments; others, only outlines or conclusions; others want only a reference book. In foreign schools, especially in Germany, where the standard of qualifications of teachers is very high, much more dependence is placed on the teacher and less use is made of text books than with us. As the work in our schools becomes more inductive in character—more for discipline and less for information—text books of the ordinary didactic kind will probably be introduced later and later in the course. (Compare page 120.)

Laboratory work is favored by the great majority, though sometimes by this expression is evidently meant merely demonstration by the teacher and sometimes the meaning is doubtful. Unfortunately, few teachers can speak of the results of this kind of teaching, it has been tried so little, except in the normal schools; in these, of course, the end is (in part) professional, and the work would be likely to be different from that best suited to the average student.

Mathematical knowledge to be assumed.—With regard to the amount of mathematical knowledge to be assumed there is the greatest diversity

of opinion. Nine replies advocate more or less decidedly the requirement of plane trigonometry; another suggests that the teacher should give briefly the trigonometrical notions that are necessary, which could be done thoroughly in half an hour. The general view may be said to be that the student should have a ready command of arithmetic (including familiarity with tables of English weights and measures and of the metric system), of algebra through equations of the second degree, and of elementary geometry. Of these the first is least likely to be secured, for the drill in higher arithmetic appears to be at the expense of that training which is the most useful for its applications in physics, viz, that which enables the pupil to solve easy problems readily and often mentally. Certainly college students show the lack of this kind of training to an unfortunate degree. If physics has been taught in the grammar school, students who leave at an early age will have some knowledge of the subject, and it need not come in the high school course till the amount of mathematical knowledge above stated has been secured; if not taught in the grammar school the interest of the majority may require that the study should be begun in the first or second year; in this case the omitted subjects may profitably come with a thorough review in the last year.

Cost of apparatus.—With regard to the cost of the apparatus required for the high school course opinions vary very widely, from $25 to $5,000, many of the writers not venturing to give figures at all; about two-thirds of the replies place the cost at not over $300, and of these about one-half put it at not over $150; surely, then, the cost of the apparatus is not a serious obstacle to the introduction of physics into the course. But many of these smaller sums are stated on the assumption that simple apparatus is to be made or used by the pupil. If the teacher is to perform all the experiments for a year's course, far more topics will be treated, and both more and more expensive apparatus will be indispensable. The question of expense resolves itself largely into the question of allowing the teacher time to superintend laboratory work, and to make much of his apparatus, or of buying more apparatus outright. Without either objecting at all to the laboratory system, which has already been discussed, or advising the purchase of "sets" of apparatus that often contain pieces that can profitably be made at home, the attention of inexperienced teachers and of school boards may be called to the unwisdom of a penny wise and pound foolish policy on this matter. If the teacher's time is worth anything his own arrangements often cost more than those from an instrument maker; and being made largely of wood, unless this is properly selected and very well seasoned, they may warp so as to be useless before the next year; besides, unless the pieces are well made and well suited to their purpose they are almost worthless to any teacher except the maker, and so the money has been spent on temporary expedients. Experience will enable one to distinguish between a wise and helpful use of common materials and simple devices and the laborious making

of instruments here criticised. But however large the expenditure may have been for the best apparatus that is suitable for the school, the teacher will always find enough to do with his hands and tools.

Importance of the work in secondary schools.—In considering how the study of physics is to be made most useful to the community, both directly and indirectly, it is difficult to overestimate the importance of correct views of the opportunities of the secondary schools. Commissioner Eaton's tables show more than a quarter of a million students in them and only an eighth as many in the colleges. These students are young enough to retain the child's love of nature and of objective teaching; yet experience shows that they are mature enough to profit by a thorough study of this subject, which is one of the very best for inductive training, and even those who are to have further opportunity in college will derive benefit from having their intellectual eyes opened to the world around them. They will come to the higher study of the subject without that illiberal, depreciative feeling toward it and other scientific studies which is commonly the result of ignorance about them. On the other hand, the lower schools and country schools draw their teachers largely from the high schools and academies. So at no point in the whole system is the importance of good, clear, accurate, inspiring training in physics more important than in these secondary schools, to which so many pages have already been devoted.

Two or three remarks of a general character may not be out of place before passing to a new topic. The schools in which there will generally be the greatest difficulty in introducing science studies are the smaller ones, where the classes are small and the teachers few. Here relief may often be found by doubling the classes, so that the subject will come around only once in two years. It would hardly be possible to arrange a course in the rudiments of science that could not be worked in this way.

In some of the English cities the difficulty of having a teacher in each building competent to give the few hours a week of science teaching is met by having one teacher go from school to school, as in this country the teachers of music do.

To give variety to the teaching a number of familiar expedients may be used. One student may find out about a particular subject by inquiry or from books, and tell his results in class, or read a composition on it, or show to the class some experiment, according to his age. Biographical sketches or stories or incidents about scientific men may be introduced thus and will give a human interest to the study that is often lacking, but very desirable. The files of Nature and the Scientific American Supplement contain much matter suitable for such exercises.

IX. REQUIREMENT OF PHYSICS FOR ADMISSION TO COLLEGE.

Question 4. How much study of physics should be required for admission to college: (*a*) on a classical course? (*b*) on a non-classical course?

Those replies that could be sufficiently abbreviated are given in the table and a reference is made to the others. The question is answered in three ways: by naming a text book to indicate the amount advised, by stating a time, or by a descriptive answer. The first two of these could usually be tabulated in the author's words; answers of the third kind are condensed to a word or two, or if possible to a time, which is put in brackets [ ]. The majority of writers favor the requirement, but many would be satisfied with what could be given in the grammar school. It is difficult to average the replies, but it is not far from the truth to say that the majority of those favoring it advise more than half a year; it is, however, quite possible that some of these would say so small a requirement would be of little value, unless merely as an entering wedge for a longer one.

These considerable differences of opinion may arise from a difference of opinion on other questions, of which some of the more important are (1) To what extent should the colleges aim to raise and shape the courses in the high schools? (2) Is the training given by physics, as it is likely to be taught in most high schools, so essentially different from that given by other studies as to justify its requirement? (3) Can time be found for it in the course without overcrowding? (4) Is it the *chief* aim of entrance examinations to determine whether the student's general intelligence and his information on a few specific subjects are sufficient for him to take the college course with profit; or (5) whether his mental training and maturity of thought are sufficient for this purpose? Lastly, (6) Will the requirement amount to anything if it is made? It would lead too far to attempt to discuss these questions here, but the analysis of the replies shows that the majority of the writers would answer them in such a way as to strengthen their claim for some requirement.

On the other hand, several of the replies object to making any requirement of consequence; none except such as every student worth sending to college will gather; for previous work generally starts a student wrong, and must be *undone* (50). I would not require any previous knowledge until the schools generally teach it or at least are supposed to do so. It is better to begin on the plane of the average student at entrance (53). Only such as to give a knowledge of the more important phenomena and terms necessary to describe them (55). A year, if the teacher is capable; otherwise the less the better (67). The disadvantages that might follow or that have followed the requirement, as stated in reply to question 8, are these: Wrong, incorrect, false ideas are inculcated; the conceit of half knowledge makes the college work difficult; previous bad training is shown in careless and slovenly ways; much must be undone, and so there is a loss of time and work. There are already too many studies taught in the preparatory schools; it interferes with language studies and with the prosecution of other studies, for which the tender mind is better adapted. Several replies sum up nearly

all of these in saying there are no disadvantages except such as would apply to any study in the course, some of which are no more important than this. The great majority, however, of replies assert that there are no disadvantages or that the writers have seen none, many of the objections just quoted being the words of those who advocate the requirement. The reply which most nearly represents the views of the non-scientific portion of those whose opinion on this subject is of importance is probably this: It is an impertinence for any college to examine a boy on chemistry, &c., on matriculation. The requirement of physics for admission to college appears preposterous to me. The examinations are intended to test the candidate's ability to profit by the college course, and it stands to reason that that does not depend on his knowledge of a few facts of nature. Hundreds of boys have their education ruined by going to college without the necessary knowledge of the languages. Too often the college work is anticipated with disastrous results (47). It need hardly be said that this criticism is aimed at ideals of science study that are behind the age, although many teachers have not yet left them behind. There is one difficulty not referred to in the replies that experience has shown, a difficulty peculiar to scientific studies, viz: how to treat students conditioned in physics on their entrance examinations. Usually they have been taught imperfectly, with few experiments, and to allow them to remove their conditions by passing an examination on more book study, and that private study, seems illogical and undesirable. The best way seems to be to send the boys to a private tutor, who will provide at least the fundamental experiments.

The expected or realized benefits of the requirement are reported as follows: The student need not waste his time in college in doing the elementary work, but he and the professor can do higher work (10, 54, 58). Few get a love for the subject who do not take it up until they find it in the college course (22). Among the students that I have prepared for college I have always found that those who had this elementary training have stood highest in all their classes (8). The requirement would *compel* preparatory schools to teach physics (48). Those students who have had a really good previous training acquire habits of mind which make their subsequent studies in college far more easy and profitable. The great object of teaching physics is to train the mind to habits of accurate observation and of precise and clear reasoning (51). The novelty of a subject often constitutes its main difficulty; so the removal of strangeness and the knowledge of terms will be of value (53). It is of enormous advantage to a student to have a familiarity with the terminology of physics and of common phenomena. He cannot too soon acquire scientific methods of thought (55). The requirement stimulates secondary schools (61). It gives a familiarity with the ideas of physics. These can only be assimilated slowly (64). Students who have received good instruction show more independence of thought. Those without such training have difficulty in breaking away from the

habit of mere memorizing acquired in elementary language work and in mathematics as too commonly taught (66). The replies from those colleges which have the requirement for any course favor its continuance; while the opposition (not merely criticism) to it from the college men who report is not generally based on experience.

To sum up what has been said: The study of physics is fitted to give results in mental training that are of very high value and that cannot be given so well by other studies; it is to be considered an essential subject in the secondary schools; in these it will usually be better taught if the college has even the slight supervision over the teaching that a requirement for admission would give, and so this requirement would react to the benefit of the communities where these schools are situated. In 1881 about 1,500 preparatory, city high, and other secondary schools reported to the Commissioner of Education; they enrolled 225,000 students, of whom only 30,000 are reported as preparing for college or scientific schools; even in the preparatory schools and preparatory departments of colleges hardly half of the students expect to go further; so it is obviously a great convenience and a measure of economy to make the preparatory studies so far as possible the same as those best fitted for the majority of students; the requirement of physics would not, therefore, in most good schools lead to the addition of a new study; it would simply increase somewhat the size of the already existing classes. The study as a preparatory one could hardly fail to give, even if poorly taught, some knowledge of common phenomena and physical terms and some seminal ideas of the subject that would continue to grow and would bear fruit a few years later, when the student comes to the study in college, although they might not be revealed by a formal examination. If well taught, the inductive training would be so inspiring and vitalizing that better work would be done by the student in all subjects of study. The disadvantages and objections, though very real, do not seem to outweigh the benefits in the opinion of most of the writers of the replies, and will mostly disappear as the teaching improves. No more powerful influence could be exerted to improve the quality of the teaching than to make this requirement now under consideration and to enforce it as rigidly as any other requirement. Not the least important factor in this influence would be the recognition by those who shape the ideals of education that scientific study holds an essential place in any training that is not onesided and illiberal. The German Gymnasien, which are the avowed models of many of our teachers who discredit scientific studies, prescribe extended courses in various sciences; so the student before going to the university has a rounded, balanced training that some of our institutions almost forbid to the student, even when they offer him a wide range of electives and tempt him to specialize.

Several replies advise a longer preparatory course for non-classical than for classical students, while a few hold the converse opinion, but

the general view is that the courses must be the same; for it is impracticable to provide in the schools for two different courses, unless, indeed, they differ simply in this, that one of them covers only the first part of the subject.

X. COÖPERATION BETWEEN THE SCHOOLS AND COLLEGES.

In refreshing contrast to the contradictory opinions given on some of the preceding points is the uniformity of the hopeful answers to question 6: Do you think that a course of study in physics can be planned that would, both in extent and character, be likely to satisfy both the schools and the colleges that require this study for admission? * * * If so, is the common ground to be sought in such a course as is described in your answers to 3 and 4? With scarcely an exception, the answer to the first part of the question is affirmative, though several times qualified by a "probably" or by the remark "*it ought* to satisfy them." The second part of the question also receives an affirmative answer in nearly every reply, though with many more expressions of hesitation and doubt. Clearly, then, the way is open for such a committee as is contemplated in the circular of the Commissioner.

XI. THE STUDY OF PHYSICS IN COLLEGE.

Question 5. In what respects should the instruction in college differ from that described under 3? (*a*) Of students who begin the work in college? (*b*) Of those who have the preparation you suggest under 4 (*a*) (for classical students)? (*c*) Of those prepared as suggested under 4 (*b*) (for non-classical students)?

The answers to (*a*) are pretty uniform and to only a slight extent contradictory. There should be no difference at first in the character of the work: the alphabet is the same for the child and the man; but though the work is inductive and elementary, beginning at the beginning of the subject, the maturer student should be able to make more rapid progress and to cover more ground; because, too, of his maturity, he can get a better grasp of principles and theories and can make more use of deductive methods. His acquaintance with trigonometry will allow of the introduction of a more mathematical treatment of some points. In the replies the principal answers are: No difference; more extended; more time; more theoretical; more systematic and mathematical; more minute, disciplinary, exact, quantitative; it should be accompanied by laboratory work. At present this class (*a*) includes by far the greater part of all college students, and a fuller discussion is needed than can be based on the present replies as to the amount, character, kind, time, and results of laboratory work for them.

(*b*) The course advised for classical students who have made the preparatory work previously described will obviously depend on the amount of this preparation. If no more than the grammar school course

or a term in the high school, the course in college will not differ in any important feature from that just presented for beginners; but if the preparation has been good and thorough the course advised omits entirely the simpler facts and is more mathematical and disciplinary than that of the high school or than course (*a*). It should be more scientific, complete, and advanced, and of a higher order, fitted for maturer students, exacting work with the *principles* of the science, using a full text book, and accompanied by lectures from the professor, not to any extent experimental (61).

(*c*) For the non-classical students the replies advise a course not differing from the last except that it is still more extended and embraces original investigation in the physical laboratory. This last suggestion, however, if it means work of more than the slightest originality, will by many be considered not well advised; for only a small portion of these students desire to make physics a specialty, and to make the highest sort of work in it an essential part of the course for others would be a blunder. With the change of a word or two Hamilton's remark would then apply here: "Nothing has more contributed in this country to disparage the cause of classical education than the rendering it the education of all."

Question 7. The replies to this question can be summed up very briefly. With great unanimity it is said that physics should be a prescribed study in college for all students; in other words, the training and information this subject can give are so important that the student should not be allowed from caprice or ignorance to omit its study. If thorough preparation has been required for entrance some writers would not absolutely require the further study of the subject in college.

Trigonometry should precede it in the course for all college students, unless, as a few think, an exception is to be made in favor of the beginners in physics.

Higher mathematics should not be required of any except special students. Two or three writers point out the advantage to the ordinary student of a knowledge of the elements of analytical geometry.

Elementary laboratory work is generally advised. The character of this work has already been discussed on page 123.

The only remaining point relates to the year of the college course in which the study should come. The answers range from the first to the fourth. If trigonometry is a prerequisite, physics can seldom be taken up at the beginning of the first year; so it comes usually in the second or third. Harvard is the principal college where the subject comes in the first year. If electives are freely offered and physics is a prescribed study, it will naturally come in the earlier years. Undoubtedly the students are more mature and better able to profit by a deductive method in the later years of the course, but if the teacher uses the inductive method the earlier the work comes the better. In any case it must not come so late as to preclude, for those whose interest is aroused, the ad-

vanced study of mathematical physics or physical measurements. It is unfortunate that so many years must usually elapse between the study of the subject in high school and college that the preparatory work is in great part forgotten.

XII. SUGGESTIONS IN REPLY TO QUESTION 10.

Under this head some miscellaneous suggestions are made and some writers have given connected courses of study. A part of these replies have already been quoted; the principal ones of those remaining are given below.

It seems important that this study should be so conducted, especially in the academies and high schools, as to make the students intelligent "browsers among books." To this end, while text books as such are disused, reference books suited to the needs of the pupils should be within their reach and the pupils should be encouraged to use them (5). The doctrine that physics is best taught without a text book is fallacious; true only with regard to the grammar school. A course of study which compels the student to prepare his work for a daily examination, accompanied with illustrative experiments with well appointed apparatus, seems to me to be the best method of teaching physics in academy or college (24). The colleges cannot require an *experimental* course as a preparation, but should give and *require* thorough laboratory work on the part of every student (25).

I am inclined to think that college professors assume an amount of knowledge and an ability on the part of college students that unfortunately do not exist (29).

Physics should be taught in the lower schools to teach observation and stimulate experiment; it should be confined strictly to the rudiments, so that there may be a successive development up to the technical school. It should be taught practically in the academy and high school, and more scientifically and theoretically in the college (34).

In the present state of the admission of its claims the following seems to me to be a necessary and sufficient course in physics: (*a*) Primary: Two or three lessons a week of a very elementary character, extending through one year. (*b*) Secondary: In a high school or academy, 200 lessons of one hour each (one year), with text book in the pupil's hands; principles fully illustrated by experiments on the lecture table of the teacher; to follow geometry in the course. (*c*) Higher: In college, not earlier than the sophomore year, after plane trigonometry, 150 hours (in one year) of exacting work with the *principles* of the science, using a full text book and accompanied by lectures from the professor, *not* to any extent experimental; during the junior or senior year, at least 6 hours a week of laboratory work, devoted mostly to one or two divisions of the subject, attention being given to the *quality* rather than the *quantity* of the work (61).

In the grammar school the main thing should be to awaken an interest in physics; so the work should be simple and in general qualitative. In the high school a little of quantitative work should be done in connection with the mechanical powers or the pendulum, and a beginning should be made in the discussion of equations which are involved. Not much of this work should be attempted, however. In college I would make the scientific course involve more physics than the classical. For regular students, taking ordinary courses, say two years obligatory (three times a week), and for classical half a year obligatory and another half year elective (67).

XIII. CONCLUSIONS.

In drawing this work to a close, we may restate the conclusions to which it is believed every reader of the foregoing pages will be led with more or less of certainty.

(1) Some words are used ambiguously or confusedly. Especially is it desirable that in some way greater uniformity and accuracy may be secured in the use of the name laboratory work; for we have seen how many ideas, some of them clearly incompatible, are included under it, so that several terms are needed in place of one; further, laboratory work and inductive teaching must not be considered equivalent terms.

(2) Some points are still unsettled. Besides the general question of how much is at present practicable in attempting to advance the standard of physics teaching in the schools, opinions are divided as to how much mathematical knowledge should be assumed in the high school; as to whether experimental work by the pupil is desirable or feasible except in college, and whether it should be required there; and with regard to the exact nature of the inductive method so far as it is fitted for use in schools. A fuller expression of the results of experience on these points is needed.

(3) On some points the replies are so nearly uniform and agree so well with the teachings of European writers that the following conclusions may be considered as well established: The ideal scheme of study at the present time includes a course in physics running through about a year in each of the four grades of American schools. It would occupy in the primary department probably not much over one hour a week; in the grammar, one to two hours; and in the high school, four or five hours, perhaps more if much laboratory work is introduced. In some cases, when there are enough competent teachers, the first and second may be divided to form three courses, as in the St. Louis plan.

In the primary department the work would be by object lessons, in the best sense of the term, dealing with such simple things as the properties of matter, some meteorological phenomena, the child's toys, &c.

In the grammar grades all five branches of physics should be studied, paying especial attention to common useful phenomena and instruments: for example, to weights and measures, the mechanical powers,

equilibrium, the effects of heat, &c.; but the work should be thorough, not a smattering of many topics, and the amount to be taken on trust without experiments should be very little. When the course is a well developed one, a text book may sometimes be used with profit.

In the high school the work should be primarily for training, and therefore inductive, Socratic, in method, at least during the first part of the course; so such experiments should be chosen as will stimulate the student to frame an hypothesis in explanation of them, to draw conclusions from it, and to test these by familiar phenomena, new experiments, or by facts already recorded. Good, easy numerical problems will be one of the very best tests of the clearness with which a principle is grasped. A text book of more or less fulness in the pupil's hands is generally found desirable. If a suitable one is not found, the simple plan of leaflets (whether written, papyrographed, or printed) may be helpful for a few months, and then a book of the usual sort be taken up (p. 120). Work in the laboratory by the pupil is pretty generally advised and appears to be esteemed most highly by those who have had most experience in teaching with its aid. A thorough knowledge of arithmetic (written and mental), of algebra through equations of the second degree, and of the elements of geometry should be assumed in all schools except the weaker ones, and perhaps also of the trigonometrical lines.

These three courses, if all are given, will come most appropriately in the latter years of each of the three departments, but may come earlier if either the first or second is omitted or if the standard of the school is low. The book should be small rather than large and no more topics should be selected than can be studied thoroughly; to impart merely a smattering of the whole book, picking out the most entertaining parts and not aiming to secure proper training, is a disgraceful injustice both to the student and to his future teachers.

A requirement of physics for admission to college is desirable on many grounds. It would enable the college classes to do better work, would benefit the student, would stimulate the secondary schools, and so by improving the teaching in them would benefit the whole community. The study is unquestionably suitable for these schools; in the opinion of many teachers there is time for it in the course, and almost the only objections raised are those due to imperfect teaching. In no other respect are most of our colleges so far behind the standards of admission to French and German higher schools as in the omission of any requirement of scientific knowledge and training. The requirement of even a term's work, till a full year can generally be asked, would apparently meet with approval from the writers of the replies. It would be better to confine the work mainly to mechanics, if by thus limiting it inductive training might be secured. The leaflet plan may make this quite feasible. The elementary phenomena of heat and electricity, however, should not be entirely omitted. In any case the benefit to the boy from

this short course will come rather from his acquiring some general notion of the terms and subject matter and from the training than from the detailed knowledge he may have crammed. The training will be secured only by thorough study of the parts chosen, not by skimming over the whole subject, which would deprive the college course of novelty and perhaps of interest.

A progressive course of study in the main like the one sketched in the preceding paragraphs would generally meet the wants of the schools and of the colleges requiring the subject for admission, so far as we may judge from the replies, although the full requirement cannot be made for some years yet.

In college the study should be required of all students, unless possibly those are excepted who have had a good course in the high schools. If the class is composed of beginners a larger portion of the time may be devoted to the principles and to deductive work with mathematical developments than was proper in the preparatory work; but it would be a serious injustice to the student to allow him to finish his work without any training in the inductive method and without seeing (or perhaps performing himself) sufficient experiments to illustrate thoroughly all the principal topics. If this thorough preparation has been secured in the high school, the student will probably find most profit in a course of lectures and recitations on the principles of physics and the methods by which they have been established, with few experiments, and in a course of quantitative laboratory work. It does not seem best for any of these courses to require much, if any, knowledge of mathematics higher than trigonometry.

No support is given to the notion common among men of a literary education that physics can be learned as history is—by reading a book; the experiments are essential to the study and will rarely be witnessed unless in connection with the school work: to pretend to teach physics without providing suitable experiments in sufficient number to illustrate the subject must be considered as a case of false pretences.

(4) Everything should be done that will help to improve the character of the work in physics and to end the uncertain, tentative methods and the perplexities of most teachers. One helpful thing would be to make physics a requirement for admission to college, as this would improve the work in both school and college. Another is the reporting by teachers, in educational journals or elsewhere as opportunity offers, of the results of their experience: What methods of work different from those in the common books have been tried and what has been the result: success or failure? What advantage is actually found by teachers of any grade to result from the work in previous grades? If such reports, whether printed or not, and any other appropriate facts are sent to the Commissioner of Education, they will be available for use in any way that may hereafter seem advisable.

The most helpful thing at present would be a report such as was contemplated in the circular of the Commissioner accompanying these inquiries: a report from a strong committee of experienced teachers of various grades, setting forth the ideal course of study in physics, with its aims and methods and limitations, the course that is at present feasible for the majority of good schools of each grade, and the steps by which progress toward the ideal is to be made. The report by Professor Clarke, published by the Bureau of Education, showed what was actually the character of the teaching of physics five years ago; the replies now published state with little detail what amount and what kind of teaching are desirable. A committee of teachers, after considering the evidence that is submitted to them in the light of their own experience, should be able to draw up a practical scheme sufficiently definite, detailed, elastic, and progressive to secure its wide adoption in the schools of the country.

SUPPLEMENTARY NOTE.

Since the preceding pages were written the writer has had another opportunity to observe the various degrees of training in, and knowledge of, physics acquired by students who have presented themselves for an entrance examination in this subject; and he is strengthened in the conviction, that has been growing for years, of the need of greater uniformity in the preparatory work. If the fundamental points have been neglected, either the college class must be kept back to study these points or the poorly prepared student must build all his advanced work on an uncertain foundation. The writer desires, therefore, in this note, to make some additional suggestions intended to promote greater uniformity and to express an opinion on some details of the work.

We may suppose our remarks addressed to a teacher in an average secondary school, who is painfully conscious that his qualifications are far below those of the ideal teacher of physics. To be more definite, assume the case of one who has never taught physics before, but who has studied the subject a little in college, or has had a fair high school course, which is now forgotten. His class numbers, say, fifteen or twenty. They have had some study of algebra and have acquired (perhaps from their arithmetic) some fundamental notions of geometry. It is to be hoped that they have studied some science before—botany or physiology. The schedule allows exercises enough in physics to amount to three or four hours a week for a year. It should also allow the teacher a few hours a week free from classes to give time for the preparation of experiments. Some apparatus is to be ordered, say, to the value of $200 or $300.

This young teacher has now before him for immediate settlement several questions on which experienced men differ, such as: Shall the teaching be inductive or didactic in the main? Shall laboratory work be provided? What sort of a text book shall be selected? What topics

are to be considered as fundamental, never to be omitted or skimmed over? Such questions as these our influential educational bodies ought to answer through competent committees. Meantime we may give some preliminary answers.

(1) Let the teacher become imbued with the spirit of the inductive method, so far as possible, by reading books or articles illustrating it and by referring constantly to such advanced works on physics as will keep him alive to the fact that he is teaching an experimental science; that memorized words without definite ideas, that principles or laws without material facts behind them, have no place in science: then, and only then, will it be possible to follow successfully an inductive method or any other good method in his teaching. His teaching will be most fruitful if he follows the inductive method as far as he can; but usually he cannot go very far, for here, more than in any other method of teaching, experience is almost indispensable. As one element of the method, he may lay down at the outset the general rule that a text book lesson should be illustrated with experiments and be talked over with the class before it is assigned to them for study. In order that the experiments may succeed, it is necessary to arrange the apparatus before the hour for meeting the class, and every experiment must be tried beforehand, for the freaks of even the simplest apparatus are often unaccountable.

(2) If the teacher is allowed the extra time necessary for it, he will do well to provide laboratory work in a modest way, say one exercise a week, lasting not less than one hour, and, if possible, filling two consecutive hours; at first it will be enough easier for him to pay for the extra time if he divides the class into two sections for this work, though fifteen is not too great a number for an experienced teacher to superintend. The students may work usually in groups of two or three, or even four, if the students of each group are of equal ability; but no individual must be allowed to become a leader and do all the thinking for the group. Four to six experiments, either different or partly duplicated, must, therefore, be in readiness.

For managing this work three ways are possible: (*a*) let the teacher first perform all the experiments and then require the class to repeat as many of them as they have time to do; (*b*) provide written directions for each experiment; (*c*) use one of the few text books that contain directions for such work. Probably the teacher who is beginning the work will find method (*a*) the best, with occasional use of the others. The best of the books suitable for (*c*) are probably too difficult for such a school as this. Unless considerable apparatus is duplicated some students will perform their experiments prior to the recitation on a topic, others after it; but all will have seen the teacher perform it, and the experiment may be as valuable in review of the lesson as in advance of it. Notions of accuracy will be instilled by requiring all experiments involving measurements to be repeated two or more times.

A valuable incidental training comes from writing up the note books, describing accurately and concisely at least the results of the experiment.

(3) Closely connected with the last two questions is the troublesome one of a text book. But, in spite of the defects of many books, and of the want of adaptation of others to the circumstances of the school and the teacher, and of the greater difficulty in following an inductive method when a book is used, some text book must usually be chosen, both to save time and to give more scientific, scholarly statements of facts and principles than will be obtained without it. So far as possible the book should combine these merits: It should be accurate, clear, and not too large; it should be written in such a style as rather to recall to the student's attention familiar facts than to tell him about these or about many other far-away things that he cannot observe; it should present most of its experiments and illustrations before giving definitions or laws; should suggest experiments or questions for home work, and have many common sense specific problems that do not involve laborious calculations. A merit of some books (among them Bänitz's excellent little Physik für Volksschulen) is that the paragraphs are so marked as to give a connected short course that may be taken on first going over the subject, while the remaining ones are taken on a review. For the schools now under consideration the plan of leaflets presented on page 120 may be urged if the teacher feels competent to prepare them or if he can find any suitable ones in the market. By using them for a month or two (with more frequent laboratory exercises than advised above) the pupils will have found out on what sort of a foundation the structure of physics is built, and they can scarcely fall into the habit of memorizing in a lifeless way the text book to be taken up later. A brief list of topics suitable for laboratory work, either with or without such leaflets, will be given later.

(4) Whatever printed helps the student may have, an indispensable part of the course consists of the informal lecture or talk or explanation given by the teacher; but, however clear this may seem at the time, what is given in this way seems to escape the memory, and until the boy has had considerable experience in this sort of work his recitations are not likely to be brilliant or even satisfactory; often he knows more than he can tell about the subject. Clearly the boy needs to be trained to take notes, and his note book should be examined frequently by the teacher and corrected. Some of the newer text books are open to the same criticism as the lectures: that a boy cannot make a good recitation from them. Even if this be a merit it is a rather disheartening one; but this trouble is a part of the price to be paid for the benefits of training by methods that are scientific, not dogmatic. If the teacher does not think the benefits are worth what they cost, he will save himself and his pupils much labor by using from the first a text book which is simply to be learned.

(5) The apparatus to be ordered will conform in the main to the book that is to be used; it must include some tools and materials for future use, some measuring instruments, some apparatus for students' use (with a few pieces duplicated) and some merely for demonstration: fortunately an expensive air pump, electrical machine, or induction coil is unnecessary: every fundamental principle can be illustrated without them. Many catalogues of German makers contain lists of excellent cheap school apparatus (notably that of Leybold's Nachfolger in Cologne), but the patterns are often so different from those figured in our text books as to be confusing. American makers, too, have been doing much of late to meet the growing demand for useful cheap apparatus, so that now $200 would probably buy a more serviceable collection at home than abroad. As laboratory work must be serious and yield visible results, or it will be despised, the apparatus that is bought or made for students' use should not be flimsy or in the nature of a plaything merely. For this reason, among others, the writer would not advise having the student make much apparatus during school hours.

(6) Some topics that should be regarded as fundamental will be indicated in a list to be given later and need not be repeated, but some topics that had better be omitted from the course in high schools of the grade now under consideration may be named here: those involving much reference to molecular or atomic theories; momentum and energy, unless in the simplest way; the theory of the musical scale; the laws of vibrating columns of air; polarization and interference of light. The time spent on these is likely to be taken from matters more useful and suitable to the student, whether he is to go to college or not.

The order in which the five parts of physics are taken is not very important. The most philosophical order is to trace the manifestations and transformations of energy, from the visible notions considered in mechanics, successively through the subjects of heat, electricity, sound, and light, as is done in the books of Deschanel, Gage, and Trowbridge; but the philosophy is all lost on the student if he fails (and probably he will fail) to get a good understanding of kinetic energy and its measurement.

The subject of sound is likely to be rather an unprofitable study, and should be treated quite briefly and almost wholly in an experimental way; for the teacher is more likely to be a blind leader of the blind here than in any other part of the book, and the student can rarely get any useful notion of the modern physical theory of music. But the subject of light furnishes an excellent means of training, especially through the study of lenses and mirrors; the geometrical principles involved in the construction of images, real and virtual, are very simple and should not be left for college work; the results can and should be verified very completely by experiment.

(7) In conclusion I give a brief list of fundamental experiments that should never be omitted in such a course as that before us; they may

be shown by the teacher or some of them may be performed by the student in the laboratory. Besides the *topics* involved in this list there are some others of, perhaps, equal importance not so easily illustrated by standard experiments, and every teacher will perform many additional experiments; but this brief list is drawn up in the hope that the few experiments it contains may everywhere be recognized as fundamental. Those marked with an asterisk (*) have the same character as the rest, but may be too advanced for all high schools. Experiments fitted for laboratory work are marked with a dagger (†), and those involving measurement, with a section mark (§).

Teachers of experience in well equipped schools will readily see that uniformity can be obtained only through compromises, and it is hoped they may coöperate in the attempt to secure the slight, but helpful, degree of uniformity indicated in this note.

LIST OF FUNDAMENTAL EXPERIMENTS IN PHYSICS.

[A † means fitted for laboratory work; a § involves measurement; an *, more advanced.]

† § Compare and measure lengths, volumes, and masses.
Inertia.
† § Composition of forces.
† § Parallel forces.
† Centre of gravity.
† § Lever, inclined plane, &c.
† § Pendulum.
* Centrifugal action.
† § Archimedes' principle.
† § Density and specific gravity.
Capillarity.
† § Simple barometer.
§ * Boyle's law.
Air pump experiments.
Pumps and siphon.

† § Expansion of liquids and gases.
† Bending of compound bar.
† § Verify fixed points of a thermometer.
† Conduction of heat.
† § Temperature of mixtures of water.
§ * Specific heat of a solid.
† * Latent heat of ice, steam, vapors.
Heat from friction.

† Properties of permanent and temporary magnets.
† Magnetic curves.
† Simple galvanic cell.
* Useful forms of galvanic cells.
† Effects of current on magnetic needle.
† Electro-magnets.
§ * Influence of resistance of conductor.
† Chemical effects of current.
* Heating effects of current.
* Induction.
Telegraph and * telephone.
† Frictional electricity; two states.
Electrical machine; Leyden jar.

Vibration and production of waves.
† § Resonance.
† Interference of sound (fork and jar).
§ Monochord.

† § Photometer.
Reflection; plane and curved mirrors.
† Refraction of light.
Dispersion and spectrum.
Total reflection.
† § Lenses; construction of image.
Combination of colors.

APPENDIX.

LIST OF BOOKS QUOTED FROM OR REFERRED TO IN THE TEXT OR REPLIES.

[Referred to on page 11.]

Plan d'études des écoles primaires publiques, prescrit par arrêt du 27 juillet 1882. Paris, Delalain frères [1883]. 40 centimes.

Plan d'études de l'enseignement secondaire des jeunes filles. * * * 28 juillet 1882. Same. 1 franc.

Plan d'études des lycées et programmes de l'enseignement secondaire classique. * * * 2 août 1880. Same. 1 franc 25 centimes.

Programmes des examens des facultés des sciences, baccalauréat, licence, doctorat. Same. 1 franc.

Nouveau recueil de sujets de compositions, de mathématiques, et de physique donnés aux examens des facultés des sciences, avec des modèles de développements, par François-Franck. Fifth edition. Same [1879]. 2 francs.

Witz, A. Cours de manipulations de physique, préparatoire à la licence. xiv + 506 pp. Paris, Gauthier-Villars. 1883. 12 francs.

Lehrpläne für die höheren Schulen * * * vom 31. März 1882. Berlin, Hertz, 1882. 0.60 Mark.

Ordnung der Entlassungsprüfungen an den höheren Schulen * * * vom 27. Mai 1882. Same. 0.60 Mark.

Kratz, H. Die Lehrpläne und Prüfungsordnungen für die höheren Schulen in Preussen. * * * 180 pp. Leipzig, Hauser's Verlag, 1883. 1.60 Mark.
[This contains the two last named official papers, with notes.]

Uhlig, G. Die Stundenpläne für Gymnasien, Realgymnasien, und lateinlose Realschulen in den bedeutendsten Staaten Deutschlands. 2te Auflage. 52 pp. Heidelberg, Winter, 1884. 0.80 Mark.

Schmid, K. A. Pädagogisches Handbuch für Schule und Haus. 2 Bände. Gotha, R. Besser, 1879. 29 Mark.

Diesterweg's Wegweiser zur Bildung für deutsche Lehrer. 5te Auflage. 3 Bände. Essen, Bädeker, 1879. 21 Mark.

Weinhold, A. F. Physikalische Demonstrationen. Anleitung zum Experimentiren im Unterricht an Gymnasia u. s. w. 4 plates, 483 wood cuts, 677 pp. Leipzig, Quandt und Händel, 1881. 22 Mark.

Müller-Pouillet. Lehrbuch der Physik und Meteorologie. 8te Auflage, bearbeitet von Pfaundler. 4 Bände. Braunschweig, Vieweg, 1879–'82. 39 Mark.

Bänitz, C. Physik für Volksschulen. 11te Auflage. 8vo. 127 figs., 70 pp. Berlin, Stubenrauch'schen Buchhandlung. 0.80 Mark.

Papers from the Committee of Council on Education:

Report for 1882–'83, with appendix, xliii + 783 pp. [Contains the new code.] London, Hansard, 1883. 4*s.* 4*d.*

Science and Art Department:

Thirtieth report, with appendix, cxii + 637 pp. Same, 1883. 4*s.* 6*d.*

Directory, with regulations for establishing and conducting science schools and classes. 37th ed. vii + 173 pp. London. Sold by Chapman & Hall. 1882. 6*d.*

Examination papers, May, 1882. 102 pp. Same. 6*d.*

Outline of experiments and description of apparatus and material suitable for illustrating elementary instruction in sound, light, heat, magnetism, and electricity. Prepared by Professor Guthrie. 41 pp. Same, 1882. 3*d.*

The code, with notes by John Russell. xix + 87 pp. London, Collins. 6*d*. [Many other reprints of the code, with notes, are in the market.]

Cambridge University calendar for 1883. Cambridge, Deighton, Bell & Co., 1883. 6*s*. 6*d*.

Calendar of the College of Preceptors [with examination papers]. Annual. London, Hodgson. 2*s*. 6*d*.

Royal commission on scientific instruction and the advancement of science. Eight reports and three vols. of testimony, in 9 parts. London, H. M. Stationery Office, 1871–'75. 24*s*.

[The VIth report is on the teaching of science in public and endowed schools. 255 pp., with plates of laboratories, &c., 1875. 5*s*. 3*d*.]

Payne, Joseph. Lectures on the science and art of education. Edited by J. F. Payne. London, Longmans, 1880. 9*s*.

Essays on a liberal education. Second ed. Edited by F. W. Farrar. London, Macmillan, 1868. 10*s*. 6*d*.

Jevons, W. S. The principles of science. London and New York. Same. 12*s*. 6*d*.

The cultivation of the senses. Philadelphia, Eldredge. 50 cents.

Moseley, H. E. The college student's manual. 195 pp. Grand Rapids, Mich., H. E. & A. B. Moseley, 1884. $1.

Frick. Physical technics. New edition in preparation. Lippincott.

Fifth German edition. xxv + 740 pp. Braunschweig, Vieweg. 12 Mark.

Gage, A. P. Physical technics. 200 pp. Boston, Ginn, 1844. $1.

Weinhold, A. F. Introduction to experimental physics. Translated by B. Loewy. London, Longmans. 31*s*. 6*d*.

Lardner. Handbooks of natural philosophy. Revised by Loewy, Harding, and Foster. 5 vols. London, Lockwood. 27*s*.

Tissandier, G. Popular scientific recreations. x + 781 pp. London and New York, Ward, Lock & Co. About $3.

Raymond, R. W. The merry-go-round; [includes the story The art of asking questions]. New York, Fords, Howard & Hulbert. $1.50.

The following retail or mailing prices are taken, so far as possible, from the Annual Educational Catalogue for 1883:

Arnott, N. Elements of physics. (Appleton)	$3 00
Avery, E. M. Elements of natural philosophy. (Sheldon)	1 32
Cooley, L. C. New text book of physics. (Ivison)	1 04
Deschanel, A. P. Natural philosophy; translated by Everett. (Appleton)	5 70
Gage, A. P. Elements of physics. (Ginn)	1 25
Ganot, A. Elementary treatise on physics; edited by E. Atkinson. (Wood)	5 00
—— Natural philosophy; translated by E. Atkinson. (Appleton)	3 00
—— Popular physics; edited by W. G. Peck. (Barnes)	1 40
Gillet, J. A., & W. J. Rolfe. New natural philosophy. (Potter)	1 73
Guthrie, F. Magnetism and electricity. (Putnam)	1 25
—— Practical physics. (Holt)	60
Hooker, W. Child's book of nature. III. Air, water, &c. (Harpers)	44
Hotze, C. L. First lessons in physics. (American School Book Company)	75
Mayer, A. M., and C. Barnard. Light. (Appleton)	1 00
Mayer, A. M. Sound. (Appleton)	1 00
Norton, S. A. Elements of natural philosophy. (Van Antwerp)	1 29
Perry, J. Practical mechanics. (Cassell)	1 50
Steele, J. D. Fourteen weeks' course in physics. New edition. (Barnes)	1 17
Stewart, B. Primer of physics. (Appleton)	45
—— Lessons in elementary physics. (Macmillan)	1 21
Thompson, S. P. Elementary lessons in electricity and magnetism. (Macmillan)	1 37
Todhunter, I. Mechanics for beginners. (Macmillan)	1 21
—— Natural philosophy. Two parts. (Macmillan) each	99
Trowbridge, J. The new physics. (Appleton)	1 20
Tyndall, J. Lessons in electricity. (Appleton)	1 00

TABLE I.—*Abstracts of the replies to inquiries about the teaching of physics.*

NOTE.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see page 11).

	Name of school.	Location.	Name of writer.	Table and number in Report of Commissioner of Education for 1882-'83.	Question 1—Primary schools. Should physics be taught?	Character of work?	With text book?	Can this be a basis for future work?
	1	2	3	4	5	6	7	8
	NORMAL SCHOOLS.							
1	State Normal and Training School	Gorham, Me	W. J. Corthell	III, 1, 28	×	Elementary	0	×
2	State Normal School	Plymouth, N. H	C. C. Rounds	III, 1, 57	×	Phenomena	(†)	×
3	State Normal School	Westfield, Mass	J. G. Scott	III, 1, 39	×	Elementary	0	×
4	State Normal School	New Britain, Conn	Henry E. Sawyer	III, 1, 11	×	Elementary	0	×
5	State Normal School	Albany, N. Y	Sumner H. Babcock	III, 1, 60	×	Experimental	0	×
6	State Normal School	Trenton, N. J	Austin Craig Apgar	III, 1, 59	×	Simple experiments	(†)	(†)
7	State Normal School	West Chester, Pa	C. B. Cochran	III, 1, 95	0	......	0	......
8	State Normal School	Baltimore, Md	George L. Smith	III, 1, 31	×†	Object lessons	0	×
9	State Normal School	Fayetteville, N. C	Corps of teachers	III, 1, 71	×	Steele	0	×
10	State Normal School	Florence, Ala	Marshall C. Wilson	III, 1, 1	×	Primer	×	×
11	Peabody Normal Seminary	New Orleans, La	U. Bettison	III, 2, 48	×	Simple experiments	0	×
12	State Normal College, University of Nashville	Nashville, Tenn	Eben S. Stearns	III, 1, 97	×	(†)	0	×
13	National Normal University	Lebanon, Ohio	R. H. Holbrook	III, 2, 75	×	Common things	×†	×
14	Central Normal College	Danville, Ind	John A. Steele	III, 2, 20	×	(†)	0	×
15	Southern Illinois Normal University	Carbondale, Ill	D. B. Parkinson	III, 1, 13	×	Limited	0	×
16	State Normal School	Cedar Falls, Iowa	D. S. Wright	III, 1, 19	0	Incidental	0	0
17	State Normal School	San José, Cal	Charles H. Allen	III, 1, 9	×	(†)	0	×
	SECONDARY SCHOOLS.							
18	High School	Farmington, Me	William Harper, A. M.	......	×	Simple†	(†)	×
19	St. Paul's School	Concord, N. H	J. Milnor Coit, PH. D.	VII, 66	0	......	......	......
20	Kimball Union Academy	Meriden, N. H	Marshall R. Gaines	VII, 68	×	(†)	×†	×
21	McCollom Institute	Mt. Vernon, N. H.	H. Q. Ward	VII, 69	0	......	......	......
22	Burr and Burton Seminary	Manchester, Vt	Rev. M. L. Severance	VII, 141	(†)	(†)	(×)	×

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TABLE I.—*Abstracts of the replies to inquiries about the teaching of physics*—Continued.

NOTE.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see page 11).

	Name of school.	Location.	Name of writer.	Table and number in Report of Commissioner of Education for 1882–'83.	Question 1—Primary schools. Should physics be taught?	Character of work?	With text book?	Can this be a basis for future work?
	1	2	3	4	5	6	7	8
	SECONDARY SCHOOLS—Continued.							
23	Green Mountain Seminary	Waterbury Centre, Vt.	A. M. Marsh	VII, 142	×	Talks	0	(†)
24	Phillips Academy	Andover, Mass	William B. Graves	VII, 35	×	Common facts	0	×
25	Cushing Academy	Ashburnham, Mass	Charles D. Adams	VII, 36	×	Simple facts	0	×
26	G. W. C. Noble's Classical School	Boston, Mass	Merton S. Keith	VII, 40	×	General	×	×
27	Public Latin School	Boston, Mass	E. P. Jackson	VII, 42	×	Common phenomena	0	×
28	High School	Bridgewater, Mass	H. H. Gay	......	0	......	......	......
29	Cambridge High School	Cambridge, Mass	William F. Bradbury	VII, 43	(†)	Oral	0	(†)
30	Home School for Young Ladies	Everett, Mass	Mrs. A. P. Potter	VII, 46	......	Oral	......	......
31	St. Mark's School	Southborough, Mass	L. B. Treharne	VII, 58	0	......	......	......
32	Commercial and Collegiate Institute	New Haven, Conn	F. B. Stevens	VII, 7	0	......	......	......
33	Norwich Free Academy	Norwich, Conn	Rev. William Hutchison	VII, 9	×	Simple experiments	0	×
34	Connecticut Literary Institution	Suffield, Conn.	M. H. Smith	VII, 10	×	Rudiments	0	×
35	Woodstock Academy	Woodstock, Conn	J. Henry White	VII, 11	×	Object teaching	0	×
36	Greenwich Academy	East Greenwich, R. I	William L. Burdick	VII, 132	×	Very elementary	0	×
37	English and Classical School	Providence, R. I	William A. Mowry	VII, 134	0	Incidental	......	......
38	Cazenovia Seminary	Cazenovia, N. Y	Aaron White, A. M.	VII, 77	×	Oral, experiments	0	(†)
39	Columbia Grammar School	New York, N. Y	Charles H. Baker	VII, 89	×	(†)	0	×
40	New York Latin School	New York, N. Y	V. Dabney	VII, 91	× †	Elementary	0	×
41	Preparatory Scientific School	New York, N. Y	Alfred Colin	VII, 92	×	Experimental	×	×
42	Union Classical Institute	Schenectady, N. Y	Charles S. Halsey	VII, 101	0	Incidental	0	0
43	Rev. M. R. Hooper's Academy	Yonkers, N. Y	Rev. M. R. Hooper	VII, 105	×	Experimental	0	×
44	Wyoming Seminary	Kingston, Pa	Rufus B. Howland	VII, 117	0	General	......	......
45	Kenmore University High School	Amherst, Va	H. A. Strode	VII, 143	×	Ganot	×	......

46	Academy of Richmond County	Augusta, Ga	John A. A West, M. D., A. M	VII, 12	×	Slight	×	×
47	Collegiate School	Cincinnati, Ohio	Rev. J. Babin	VII, 108	×	1 hour per week	0	0
48	Indianapolis Classical School	Indianapolis, Ind	T. L. Sewall	VII, 22	×	Primer	×	×
49	Tullahoma College	Tullahoma, Tenn	Miss C. S. Burnett	VII, 140	×	(†)	×	×
	UNIVERSITIES AND COLLEGES.							
50	Amherst College	Amherst, Mass	Marshall Henshaw	IX, 143	0	(†)	0	0
51	Harvard University	Cambridge, Mass	Wolcott Gibbs	IX, 146	×	(†)	0	×
52	Hamilton College	Clinton, N. Y	Ambrose P. Kelsey	IX, 204	×	No expts	×	0
53	Rutgers College	New Brunswick, N. J.	F. C. Van Dyck	IX, 192	×	Qualitative	×†	×
54	Lehigh University	South Bethlehem, Pa	H. W. Harding	IX, 296	0			
55	Johns Hopkins University	Baltimore, Md	{ C. S. Hastings H. A. Rowland	IX, 134 IX, 134	0			
56	University of Virginia	Charlottesville, Va	Francis H. Smith	IX, 347	×	Experimental	×†	×†
57	West Virginia University	Morgantown, W. Va	D. B. Purinton	IX, 370	×	Familiar talks	0	0†
58	University of Louisiana	New Orleans, La	Brown Ayres	IX, 127	(†)	(†)	0	(†)
59	Southwestern University	Georgetown, Tex	C. C. Cody	IX, 330	×	Elementary, 2 years	0	×
60	East Tennessee Wesleyan University	Athens, Tenn	L. B. Caldwell	IX, 310	×	Reason Why	×†	×†
61	Ohio State University	Columbus, Ohio	T. C. Mendenhall	IX, 244	×	(†)	(†)	×
62	Farmers' College	College Hill, Ohio	Albro D. Morrill	IX, 242	×	(†)	0	×
63	Ohio Central College	Iberia, Ohio	A. C. Crist	VII, 113	×	(†)	0	(†)
64	Northwestern University	Evanston, Ill	H. S. Carhart	IX, 44	×	Familiar†	0†	×
65	Knox College	Galesburg, Ill	Milton L. Comstock	IX, 46	×	(†)	×	(†)
66	University of the State of Missouri	Columbia, Mo	Benjamin F. Thomas	IX, 170	×	Talks	0	×
67	Washington University	St. Louis, Mo	Francis E. Nipher	IX, 180	×	Cooley	0	0
68	University of the Pacific	San José, Cal	T. C. George	IX, 18	×	Elements	×	×
	UNCLASSED.							
69	University of Michigan	Ann Arbor, Mich	W. H. Payne	IX, 152	×	(†)	×	×
70	State University	Iowa City, Iowa	S. N. Fellows	IX, 88	(†)	Oral	0	×
71			Unknown		0	Incidental	0	
72		St. Louis, Mo	J. B. Merwin					

Table I.—*Abstracts of the replies to inquiries about the teaching of physics*—Continued.

Note.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see pages 11 and 133).

	Name of school.	Question 2—Secondary schools.		Question 3—Secondary schools.							Question 4—Admission to college.	
		How much time?	In which year?	What should be the character of the work?	Mainly inductive or deductive?	Mainly for information or for discipline?	With text book?	With laboratory work?	How much mathematical knowledge should be assumed?	Cost of apparatus.	How much physics should be required for entrance? (a) On a classical course.	How much physics should be required for entrance? (b) On a non-classical course.
	1	9	10	11	12	13	14	15	16	17	18	19
	NORMAL SCHOOLS.											
1	State Normal and Training School, Me.	1½ years	1, 4	Experimental?	Both.	Both.	×	×	Arith., alg	$25	1½ years.†	1½ years.
2	State Normal School, N. H	1 year	2, 3	......	Both.	Both.	×	×	Alg., elem. geom	50–200	1 year.	1 year.
3	State Normal School, Mass	1 year	(†)	Elementary	I.	Both.	Ref.	×	Little	(†)	[½ year.]	[½ year.]
4	State Normal School, Conn	½ year	2, 3	Obj. and exp'l	I.	D.	......	×	Arith., alg	50–100	½ year.	1 year.
5	State Normal School, Albany, N. Y	1 year	3	Pupils experiment	I.	D.	0	×	Alg., g., trig	200	¾ year.	1 year.
6	State Normal School, N. J	1 year	3, 4	Experimental	Both.	Both.	×	×	Alg. to radicals	[200]	Gillet & Rolfe.	Gillet & Rolfe.
7	State Normal School, West Chester, Pa	1 year	4	......	I.	D.	×	×	Ar., alg., pl. g	750–1,000	None.	None.
8	State Normal School, Md	1 year	1–4	......	I.	Both.	Ref.	×	(†)	(†)	Gage or Ganot.	
9	State Normal School, N. C	1 year	4	Thoroughness	D.	I.	×	0	Ar., alg	......	1 year.	Rudiments.
10	State Normal School, Ala	1 year	4	Principles	Both.	Both.	×	×	Geom., trig	250	Com. books.	Deschanel.
11	Peabody Normal Seminary	½ year	1	Pupils experiment	Both.	Both.	×	×	Arith. and signs.	(†)	General knowledge [½ year].	
12	State Normal College, University of Nashville.	1 year	(†)	(†)	Both.	Both.	×	×	......	Cheap.	Not much, but exact and thorough.	
13	National Normal University	(†)	3	Pupils experiment	Both.	Both.	×	×	Geom., trig	Cheap.	......	......
14	Central Normal College	[½ year]	3, 4	(†)	I.	Both.	(†)	×	Little	Cheap.	......	......
15	Southern Illinois Normal University	Not 1 year	2, 3	Thorough	I.	Both.	×	×	Alg., geom	$200–300	Less than 1 year.	
16	State Normal School, Iowa	¾ year	4	Elem'y; exp'l	I.	Both.	×	×	Arithmetic	50	Standard elementary work.	
17	State Normal School, Cal	½ year	3†	Experimental	......	I.	×	×	Arith., alg	100	......	......
	SECONDARY SCHOOLS.											
18	Farmington High School	1 year†	2	Clear, principles	Both.	Both.	×	×	Alg., pl. & s. g	100	Not less than ¾ year.†	

19	St. Paul's School	1 year	3	Lessons, lects., expe	Both.	Both.	×	×	Alg., pl. geom	400–500	½ year.	1 to 2 years.
20	Kimball Union Academy	1 year	2		I.	I.	×	×	Geometry		None.	1 year. (†)
21	McCollom Institute	⅔ year	3			D.	×	×	Ar., alg., geom		None.	⅔ year.
22	Burr and Burton Seminary	(†)	(†)	(†)	D.	Both.	×	×	(†)	1,000	What is now done in college.	
23	Green Mountain Seminary	½ year	3	Simple, practical	I.	Both.	×	×	Ar., alg., pl. g	100	Elementary book.†	
24	Phillips Academy	⅔ to 1 year	3	Descriptive	Both.	Both.	×	×	Ar., alg., trig	100–2,000	Stewart, Avery, &c.	
25	Cushing Academy	1 or ½ yr†	3	Exp'l and practical	I.	D.	×	×	Alg., pl. geom		Elementary.†	
26	G. W. C. Noble's Classical School	½ year	(†)	(†)		Both.	×	×	Ar., alg	200	Mechanics.	Arnott.†
27	Boston Public Latin School	⅔ year	3	Experimental	D.	Both.	×	×	Elem'y alg., & g		Compl. course.	Mech. & heat.
28	Bridgewater High School	1 year†	†2	Experimental	I.	Both.	×	†	Ar., alg., geom	150	Fundamental.	More complete.
29	Cambridge High School	1 year	2, 3		Both.	Both.	×	×	Ar., alg., pl. g	(†)	About 1 year.	
30	Home School for Young Ladies	1 year										
31	St. Mark's School	1 year	4	Interesting	Both.	Both.	×	×	Ar., alg., pl. g	300	1 yr. optional.	1 year.
32	Commercial and Collegiate Institute	1 year	3, 4	Descriptive		D.	×	×	Little		Arnott.	Arnott.
33	Norwich Free Academy	⅔ year	3	Experimental	I.	Both.	×	×	Pl. geom., trig	(†)	(†)	(†)
34	Connecticut Literary Institution	1 year†	3	(†)	Both.	Both.	×	×	Ar., alg., g.†	(†)	General knowledge.	
35	Woodstock Academy	1 year	1	Exp'l, logical	I.	Both.	×	×	Arith	(†)	(†)	⅔ to 1 yr.
36	Greenwich Academy	⅔ year†	2, 3	General	I.	D.	×	×	Ar., alg., geom	†100	(†)	(†)
37	English and Classical School	1 year	1		Both.	Both.	×	×	Algebra	(†)	1 yr.†	1 yr.†
38	Casenovia Seminary	½ to 1 year	3	Inductive	Both.			×				
39	Columbia Grammar School	(†)	4	Practical	D.	I.	×	0	Through sq. root	150	Steele.	Ganot & probs.
40	New York Latin School	½ year	4		I.	Both.	0	×	Little		None.	None.
41	Preparatory Scientific School	(†)		Thorough	Both.	I.	×	(†)	Alg., g., trig	Cheap		Todhunter.
42	Union Classical Institute	⅔ year	3		I.	Both.	×	×	Ar., elem. alg	300	None.	None.
43	Rev. M. R. Hooper's Academy				I.	Both.	×	×			Elements, thoroughly.	
44	Wyoming Seminary	⅔ year	2, 3	General principles	D.	Both.	×	×	Ar., pl. geom	200		Mech. & elect.
45	Kenmore University High School	⅔ year†	3, 4				×		Elem. pl. geom			
46	Academy of Richmond County	⅔ of course	1–4	Practical & theoret	Both.	Both.	×	×	Very little	200–500	Little.	Little.
47	Collegiate School, Cincinnati		2, 3	(†)	Both.	Both.	×	0	Alg., geom		None.	
48	Indianapolis Classical School	½ year†	3–4		I.	I.	×	×	Alg., pl. geom		Harvard[⅔yr].	
49	Tullahoma College	½ year	2	Teach by topics	D.	D.	Ref.	×	Arithmetic†	50–100	½ to 1 yr.†	Elements.
	UNIVERSITIES AND COLLEGES.											
50	Amherst College	(†)	4	Accurate	Both.	Both.	×	0	Alg., pl. g., trig	1,000–5,000	None.	None.
51	Harvard University	1 year	1–4	Experimental	Both.	D.	0†	×	Ar., alg., geom	(†)	Thorough elementary course.	
52	Hamilton College	(†)	3	Experimental	Both.	I.	×	×	Alg., pl. geom	300–400	None.	Com. text b'k.
53	Rutgers College				I.	I.	×(†)	×	Arithmetic	100	None.	None.
54	Lehigh University	½ to 1 year†	4	Gage, Avery†		Both.	×	×	Alg., pl. geom	300–500	½ to 1 year.†	1 year.
55	Johns Hopkins University	(†)	3, 4	(†)		I.	×	0	(†)		Only a general knowledge.	
				(†)	D.	Both.	×			2,000–5,000		
56	University of Virginia	(†)	3, 4	Exp'l. Problems.	Both.	Both.	×	×	Alg., geom., trig.	(†)	(†)	
57	West Virginia University	½ to 1 yr†	3, 4		I.	I.	×	×	Alg., geom	500–1,000	None.	½ year.
58	University of Louisiana	1 yr.	4	(†)	I.	D.	×	×	Alg., geom	300	1 year.	1 year.
59	Southwestern University	1 yr.	4	(†)	I.	D.	×	×	Plane geom	1,200	Gage or Avery.	

TABLE I.—*Abstracts of the replies to inquiries about the teaching of physics*—Continued.

NOTE.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see pages 11 and 133).

	Name of school.	Question 2—Secondary schools. How much time?	Question 2—Secondary schools. In which year?	Question 3—Secondary schools. What should be the character of the work?	Question 3. Mainly inductive or deductive?	Question 3. Mainly for information or for discipline?	Question 3. With text book?	Question 3. With laboratory work?	Question 3. How much mathematical knowledge should be assumed?	Question 3. Cost of apparatus.	Question 4—Admission to college. How much physics should be required for entrance? (a) On a classical course.	Question 4. (b) On a non-classical course.
	1	9	10	11	12	13	14	15	16	17	18	19
60	East Tennessee Wesleyan University	1 yr	4	Practical	(†)	I.	×	×	Little	Inexp'nsive	Same [1 year].	
61	Ohio State University	1 yr	3, 4	Exp'l by teacher	Both.	Both.	×	(†)	Alg., geom.†	$300	1 year.	1 year.
62	Farmers' College	1 yr	1, 2	Exps. & recitation	I.	D.	Ref.	×	Ar., alg., geom	(†)	138 pp., Gage.	Gage & exps.
63	Ohio Central College	(†)	1-4	......	Both.	Both.	×	×	Through trig	300-500	(†)	......
64	Northwestern University	½ to 1 yr	4	(†)	I.	Both.	×	×	Higher arith	......	½-1 year.	
65	Knox College	½ yr	3	Accurate	I.	I.	×	0	Ar., geom	250-300	None.	None.
66	University of the State of Missouri	1 year	3	(†)	I.	D.	×	×†	Alg., geom	1,000	Norton's Elements.	
67	Washington University	1 year	4	Qualitative	Both.	D.	×	×?	Algebra	100	1 year.	
68	University of the Pacific	1 year	3, 4	......	Both.	Both.	×	×	Trigonometry	1,000	Avery.	Avery
	UNCLASSED.											
69	Professor W. H. Payne	1 year	3	Recitation†	......	Both.	×	(†)	Plane geom		1 year.	1 year.
70	Professor S. N. Fellows	½ yr	1, 2	Elementary	Both.	I.	×	×†	Arithmetic	Simple	About ½ year.	
71	Unknown	1 year	4	Purely exp'l	I.	D.	×	×	Arithmetic	100	......	......
72	J. B. Merwin	......	......	......	......	......	......	......	......	......	......	......

TABLE I.—*Abstracts of the replies to inquiries about the teaching of physics*—Continued.

NOTE.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see page 11).

	Name of school.	Question 5—Higher schools (colleges). In what respect should the instruction in college differ from that of the high school? (a) Of beginners?	(b) Of classical students?	(c) Of non-classical students?	Question 6. Can a satisfactory common course be planned?	Is the common course described in your answer?	Question 7—Colleges. In which year?	For which classes should trigonometry be required?	Higher mathematics?	Elementary laboratory work?	Should physics be prescribed?	Q. 8, 9, 10. Are questions 8, 9, and 10 answered.
	1	20	21	22	23	24	25	26	27	28	29	30
	NORMAL SCHOOLS.											
1	State Normal and Training School, Me.	None.	Scientific, exp'l, and mathemat.		×	×	2	All.	0	×	×	8, 9.
2	State Normal School, N. H.	None.	More mathematical and disciplin'ry.		×	×	......	All.	(†)	All.	×	8, 9.
3	State Normal School, Mass.	[None.]	Scientific.		(†)	......	......	b c	(†)	a †	×	......
4	State Normal School, Conn.	None.	More advanced (†)		×	×	2	b c	......	a	× †	......
5	State Normal School, Albany, N. Y.	None.	Use text book.	Investigation.	×	×	4	c	......	0	×	9, 10.
6	State Normal School, N. J.	More mature.		More advanced.	×	×	2, 3	b c	0	All.	×	8, 10.
7	State Normal School, West Chester, Pa.	......	......	......	......	......	3	All.	(†)	All.	×	8, 10.
8	State Normal School, Md.	In quantity and in use of mathematics.			×	×	1, 2	All.	(†)	All.	×	8.
9	State Normal School, N. C.	......	......	......	×	×	1	a	(†)	×	Elect.	......
10	State Normal School, Ala.	In amount of laboratory work.			0	......	1	b c	0	×	×	8, 9, 10.
11	Peabody Normal Seminary	Review; work alike for all.			×	×	(†)	(†)	0	×	×	8, 9.
12	State Normal Coll., Univ. of Nashville.	......	......	......	×	×	(†)	......	......	×	×	8, 9, 10.
13	National Normal University	......	......	......	......	......	3	All.	×	All.	×	8, 9, 10.
14	Central Normal College	Review and continuation.			×	×	(†)	......	0	All.	......	8.
15	Southern Illinois Normal University	[Longer time.]	More exhaustive and detailed.		×	×	3	0	0	×	×	8, 9, 10.
16	State Normal School, Iowa	More advanced with laboratory.			×	×	1, 2	All.	0	×	×	8, 9.
17	State Normal School, Cal.	(†)	......	......	×	×	......	......	......	......	......	8, 10.
	SECONDARY SCHOOLS.											
18	Farmington High School	More largely deductive.			×	×	2	All.	0	All.	×	8, 9, 10.

TABLE I.—*Abstracts of the replies to inquiries about the teaching of physics*—Continued.

NOTE.—× means "yes;" 0 means "no" or "none;" ...... means "no reply;" (†) refers to the full reply (see page 11).

	Name of school.	Question 5—Higher schools (colleges). In what respect should the instruction in college differ from that of the high school? (a) Of beginners?	(b) Of classical students?	(c) Of non-classical students?	Question 6. Can a satisfactory common course be planned?	Is the common course described in your answer?	Question 7—Colleges. In which year?	For which classes should trigonometry be required?	Higher mathematics?	Elementary laboratory work?	Should physics be prescribed?	Q. 8, 9, 10. Are questions 8, 9, and 10 answered?
	1	20	21	22	23	24	25	26	27	28	29	30
	SECONDARY SCHOOLS—Continued.											
19	St. Paul's School	(†)	(†)	Laboratory.	×	×	1, 2	b c	......	0	×	8.
20	Kimball Union Academy	Fuller; more advanced.		Still more adv.	×	×	3	All.	0	c	×	8, 9.
21	McCollom Institute	......	......	......	......	......	3	......	×	......	×	......
22	Burr and Burton Seminary	Practical, theor.	......	......	......	......	3	......	......	......	......	8, 9.
23	Green Mountain Seminary	None.	Higher and broader.		×	×	3	b c	(†)	a	(†)	8, 9, 10.
24	Phillips Academy	Mathematical.	More math., and original work.		×	×	1, 3	All.	(†)	b c	×	8, 9, 10.
25	Cushing Academy	More mathem'l.	Still more mathematical.		×	×	3	c	(†)	(†)	×	8, 9, 10.
26	G. W. C. Noble's Classical School	Longer laborat'ry	More thorough.		×	×	1	b	0	All.	×	8, 9.
27	Boston Public Latin School	More theoretical and math.		(†)	×	×	3	c	0	a	×	8, 9, 10.
28	Bridgewater High School	Same method, more thorough.			......	......	......	......	......	......	......	8.
29	Cambridge High School	Maturer.	More difficult book—use trig. (†)		×	×	2–3	(†)	×†	All.	×	8, 10.
30	Home School for Young Ladies	......	......	......	......	......	......	......	......	......	......	......
31	St. Mark's School	(†)	(†)	(†)	×	×	2–4	All.	(†)	×	×	8, 9.
32	Commercial and Collegiate Institute	Should not begin	Atkinson's Ganot.		×	×	3	b c	0	b c	×	8, 9.
33	Norwich Free Academy	More extensive.	More full and exhaustive.		×	......	(†)	All.	(†)	All.	×	8.
34	Connecticut Literary Institution	Should not begin	More extensive.		×	×	2, 3	All.	(†)	×	×†	8, 9, 10.
35	Woodstock Academy	......	......	......	(†)	......	3	......	......	......	Elect.	8, 10.
36	Greenwich Academy	None at first.	None.	Special divisions.	×	×	3	c	0	All.	×	8, 9.
37	English and Classical School	Less elementary, more extended, but of same nature.			×	......	1, 2	(†)	(†)	All.	×	8, 10.
38	Cazenovia Seminary	......	......	......	......	......	......	......	......	......	......	......

39	Columbia Grammar School	Peck's Ganot.		Laboratory, &c.	×	×†	3	o	0	o	×	8, 9.
40	New York Latin School						3				×	8.
41	Preparatory Scientific School			Laboratory.	×	×		(†)	0	×	×	8, 9, 10.
42	Union Classical Institute	More mathematical and of higher range.					3					
43	Rev. M. R. Hooper's Academy											8, 10.
44	Wyoming Seminary	More extensive and inductive.			(†)	(†)	2, 3	All.	0	×	×	9.
45	Kenmore University High School											
46	Academy of Richmond County	None.	Mathematical.		×	×	1	b	(†)	×	×	8, 9, 10.
47	Collegiate School, Cincinnati	In no respect.									×	8.
48	Indianapolis Classical School	None.	More advanced and exp'l.				1	o†	(†)	×	×	8, 10,
49	Tullahoma College	(†)	(†)	(†)	×	×	2	o	(†)	×	×	8, 9, 10.
	UNIVERSITIES AND COLLEGES.											
50	Amherst College	More extensive, complete, and of higher order.			×	(†)	3	All.	0†	0†	×	8, 9.
51	Harvard University	Same in kind, higher in degree.			×	×	1	All.	(†)	×	×	8, 9.
52	Hamilton College				0		[3]		[×]			8.
53	Rutgers College	Laboratory work and problems.			×		3	All.	0	×†	×	8, 9, 10.
54	Lehigh University	More extended.		More advanced.	×	×	2, 3	All.†	0	(†)	×	8, 9.
55	Johns Hopkins University	More complete knowledge of phenom. and theory.			×		[2]	All.	0	×	Elect.	8.
		One more complete than the other.									×	8, 9, 10.
56	University of Virginia	In extent and minuteness, but not in kind.			×	×	3, 4	All.	(†)	×†	×	8, 9, 10.
57	West Virginia University	Seek more for principles and discipline, math'l.			×		2, 3	All.	(†)	All.	×	9.
58	University of Louisiana	More exact.	More thorough, with theory.		×	×	2, 3, 4	a† b c.	0	All.	×	8, 9, 10.
59	Southwestern University	None.	More extended.		×	×	1	b c	0	All.	×	8, 9, 10.
60	East Tennessee Wesleyan University	Should not begin	Begin where prep. left off.		×	×	3	(†)	0	(†)	×†	8, 9, 10.
61	Ohio State University	Should not begin	More exacting; with laboratory.		×	×	2, 3	All.	(†)	0†	×	8, 9, 10.
62	Farmers' College	None at first.	More full.	(†)	×		2	c	0	a b	×	8, 9.
63	Ohio Central College				0		2–4					8, 10.
64	Northwestern University	More thorough and mathematical.			×	×	3	All.	0†	All.†	×	8, 9, 10.
65	Knox College	(†)	(†)	(†)	(†)	×	3	All.	0†	×†	×	8, 9, 10.
66	University of the State of Missouri	Should not begin	Ganot 1 yr.	Lab. and math. ph. 1 yr.	×	×	2	b c	c	(†)	×	8, 9, 10.
67	Washington University	More quantitative and mathematical.			×	×	1, 3†	All.†	0	×	×	8, 9, 10.
68	University of the Pacific	Should not begin	More experimental and extensive.		×	×	3	b c	0	×	×	8, 9, 10.
	UNCLASSED.											
69	Professor W. H. Payne											10.
70	Professor S. N. Fellows	Less elementary.	More principles.		×	×	2	All.	0	0	×	9, 10.
71	Unknown	More systematic.			×	×		None.	0	×	×	8, 9, 10.
72	J. B. Merwin											

TABLE II. — *Comparison of courses of science study.*

France — Lycées.

Age.	Class.		Subject.	Time.	Other studies.
				Hours.	
9	[illegible]	Prep	Solids, water, air	[1 to 1½]	German or English.
10		VIII	Animals, plants	[1 to 1½]	
11		VII	Geology, elementary physics	[1 to 1½]	
12	[illegible]	VI	Physics, chemistry	1½	Latin begun.
13		V	Zoölogy	1	
14		IV	Geology and botany	1	Greek begun.
15	[illegible]	III	Gravity, fluids, heat	1	Algebra begun.
16		II	Acoustics, optics	1	Algebra. Sol. geom. begun.
17		Rhet	Magnetism, electricity	(1)	Astronomy, geometry.
18		Phil	Physics (rev.) and chemistry	2	Animal and veg. physiol.

Prussia — Gymnasien.

Age.	Class.	Subject.	Time.	Other studies.
			Hours.	
11	VI	Natural history	2	Latin begun.
12	V	do	2	French begun.
13	IV	do	2	
14	Lower III	do	2	Greek begun.
15	Upper III	do	2	
16	Lower II	Physics and chemistry	2	
17	Upper II	do	2	
18	Lower I	do	2	
19	Upper I	do	2	

Boston Public Schools — 1879–1882.

Age.	Class.		Subject.	Time.	Other studies.
6	Primary.	5, 6	Oral lessons, including a little science.		
7		3, 4			
8		1, 2			
9	Grammar.	6			
10		5			
11		4			
12		3		*Hours.*	
13		2	Physics, with experiments.	1	
14		1		1½	
15	High.	1	Botany	(1½)	
16		2	Botany, zoölogy	3	
17		3	Physics	3	Chemistry, 3.
18		4	Physics, elective	3	Astronomy & chem. elect.

St. Louis Public Schools — 1881.

Age.	Class.		Subject.	Time.	Other studies.
				Hours.	
7	Primary.	H 1	Plants		
8		G 2	Animals		
9		F 3	Physics		
10		E 4	Botany		
11		D 5	Zoölogy and physiology		
12	Inter-mediate.	C 6	Physics and astronomy		
13		B 7	Physical geography		
14		A 8	Physics		
15	High.	1	Physiology		Latin, German.
16		2	Physics		Algebra begun.
17		3	Physiology, elective		Geometry begun.
18		4	Sciences, elective		

NOTES. The ages stated in the French official plan are understood to be the minimum at entrance; they are here increased by one year. The ages given for the Prussian Gymnasien are obtained by subtraction from the age at which the students graduate; this is found from a number of programs (mainly from Berlin) to be 19½ years. The minimum age of admission to most German Gymnasien is 9 years. The data for the American schools are given in the text. The numbers in this table, therefore, indicate the average age at the middle of the year, as exactly as the data will allow. The time is expressed in hours per week. In the St. Louis plan the time was until recently 1 hour. The details of some other European schools are given in the text.

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